REGISTER

OF

THE LEHIGH UNIVERSITY,

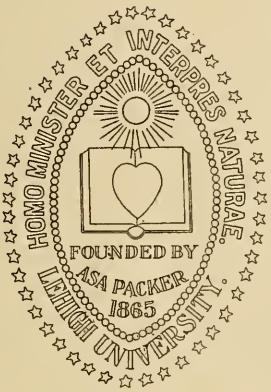
1899=1900.

SOUTH BETHLEHEM, PA.

REGISTER

OF

THE LEHIGH UNIVERSITY,



1899-1900.

SOUTH BETHLEHEM, PA.

TABULAR ALMANAC.

1899.

JULY.

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...

AUGUST.

S	M	T	W	T	F	S
...	...	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	...	...
...	...	...	...	...	...	...

SEPTEMBER.

S	M	T	W	T	F	S
...	...	...	...	...	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
...	...	...	...	...	...	...

OCTOBER.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	...	...	...	...
...	...	...	...	...	...	...

NOVEMBER.

S	M	T	W	T	F	S
...	...	...	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	...	...
...	...	...	...	...	...	...

DECEMBER.

S	M	T	W	T	F	S
...	...	...	...	...	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	...	...	...	...	...	...

1900.

JANUARY.

S	M	T	W	T	F	S
...	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	...	...	...
...	...	...	...	...	...	...

FEBRUARY.

S	M	T	W	T	F	S
...	...	...	...	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	...	...	...
...	...	...	...	...	...	...

MARCH.

S	M	T	W	T	F	S
...	...	...	...	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
...	...	...	...	...	...	...

APRIL.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	...	...	...	...	...
...	...	...	...	...	...	...

MAY.

S	M	T	W	T	F	S
...	...	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	...	...
...	...	...	...	...	...	...

JUNE.

S	M	T	W	T	F	S
...	...	...	...	...	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
...	...	...	...	...	...	...

JULY.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	...	...	...	...
...	...	...	...	...	...	...

AUGUST.

S	M	T	W	T	F	S
...	...	...	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	...
...	...	...	...	...	...	...

SEPTEMBER.

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	...	...	...	...	...	...

OCTOBER.

S	M	T	W	T	F	S
...	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	...	...	...
...	...	...	...	...	...	...

NOVEMBER.

S	M	T	W	T	F	S
..	...	...	...	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	...
...	...	...	...	...	...	...

DECEMBER.

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...

1901.

JANUARY.

S	M	T	W	T	F	S
...	...	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	...	...
...	...	...	...	...	...	...

FEBRUARY.

S	M	T	W	T	F	S
...	...	...	...	...	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	...	...
...	...	...	...	...	...	...

MARCH.

S	M	T	W	T	F	S
...	...	...	...	...	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	...	...	...	...	...	...

APRIL.

S	M	T	W	T	F	S
...	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	...	...	...	...
...	...	...	...	...	...	...

MAY.

S	M	T	W	T	F	S
...	...	...	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	...
...	...	...	...	...	...	...

JUNE.

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	...	...	...	...	...	...

CALENDAR.

1899–1900.

1899.

Sept. 23, 25, 26,	Examinations for Admission.
Sept. 27, 3½ P.M.,	First Term begins.
Oct. 12,	Founder's Day.
Nov. 29, 12½ P. M.,	Thanksgiving Recess begins.
Dec. 4, 8¼ A. M.,	Thanksgiving Recess ends.
Dec. 22, 12½ P. M.,	Christmas Holidays begin.

1900.

Jan. 3, 8¼ A. M.,	Christmas Holidays end.
Feb. 1,	Junior Prize Orations due.
Feb. 5, 8¼ A. M.,	Second Term begins.
Feb. 22,	Washington's Birthday.
April 11, 12½ P. M.,	Easter Holidays begin.
April 18, 8¼ A. M.,	Easter Holidays end.
May 30,	Memorial Day (half holiday).
June 17,	Baccalaureate Sunday.
June 18,	Class Day.
June 19,	Alumni Day.
June 20,	University Day.
June 21,	Summer Term begins.
June 21, 22, 23,	Examinations for Admission.

1900–1901.

1900.

Sept. 22, 24, 25,	Examinations for Admission.
Sept. 26, 3½ P.M.,	First Term begins.
Oct. 11,	Founder's Day.
Nov. 28, 12½ P. M.,	Thanksgiving Recess begins.
Dec. 3, 8¼ A. M.,	Thanksgiving Recess ends.
Dec. 21, 12½ P. M.,	Christmas Holidays begin.

1901.

Jan. 2, 8¼ A. M.,	Christmas Holidays end.
Feb. 11, 8¼ A.M.,	Second Term begins.
June 19,	University Day.

BOARD OF TRUSTEES.

Robert H. Sayre,	South Bethlehem.
William H. Sayre,	South Bethlehem.
Elisha P. Wilbur,	South Bethlehem.
James I. Blakslee,	Mauch Chunk.
Charles Hartshorne,	Philadelphia.
Henry S. Drinker,	Haverford.
Robert P. Linderman,	South Bethlehem.
Henry R. Price, M.D.,	Brooklyn, N. Y.
Rt. Rev. Ethelbert Talbot, D.D., LL.D.,	South Bethlehem.

(One vacancy.)

HONORARY TRUSTEES.

Rt. Rev. Leighton Coleman, S.T.D.,	Wilmington, Del.
Charles Brodhead,	Bethlehem.
W. L. Conyngham,	Wilkes-Barre.
Rev. Marcus A. Tolman,	Mauch Chunk.
Hon. Henry Green,	Easton.

HONORARY ALUMNI TRUSTEES.

	TERM EXPIRES	
W. Arthur Lathrop, C.E., Class of 1875,	1900,	Wilkes-Barre.
Frank P. Howe, B.A., E.M., Class of 1878,	1901,	Philadelphia.
Thomas M. Eynon, M.E., Class of 1881,	1902,	Philadelphia.
Garrett B. Linderman, Ph.B., Class of 1887,	1903,	South Bethlehem.

OFFICERS OF THE BOARD.

President,
ROBERT H. SAYRE.

Secretary and Treasurer,
ELISHA P. WILBUR.

Assistant Treasurer,
WILLIAM HENRY GUMMERE.

EXECUTIVE COMMITTEE.

ROBERT H. SAYRE, *Chairman.*
ELISHA P. WILBUR, HENRY S. DRINKER,
WILLIAM H. SAYRE, ROBERT P. LINDERMAN,
RT. REV. ETHELBERT TALBOT, D.D., LL.D.
R. MORRIS GUMMERE, *Secretary.*

COMMITTEE ON BUILDINGS AND GROUNDS.

ELISHA P. WILBUR, *Chairman,*
ROBERT H. SAYRE, WILLIAM H. SAYRE.

COMMITTEE ON COLLEGE ADMINISTRATION.

HENRY S. DRINKER, *Chairman,*
WILLIAM H. SAYRE, ROBERT P. LINDERMAN.

FACULTY.

THOMAS MESSINGER DROWN, LL.D.,
President of the University.
University Park, South Bethlehem.

WILLIAM H. CHANDLER, PH.D., F.C.S.,
Professor of Chemistry.
251 Cherokee Street, South Bethlehem.

BENJAMIN W. FRAZIER, A.M., SC.D.,
Professor of Mineralogy and Metallurgy.
University Park, South Bethlehem.

H. WILSON HARDING, A.M.,
Emeritus Professor of Physics.

MANSFIELD MERRIMAN, C.E., PH.D.,
Professor of Civil Engineering.
University Park, South Bethlehem.

SEVERIN RINGER, U.J.D.,
Professor of Modern Languages and Literatures, and of History.
424 New Street, South Bethlehem.

EDWARD H. WILLIAMS, JR., B.A., E.M., A.C., F.G.S.A.,
Professor of Mining and Geology.
Twelfth Avenue, Bethlehem.

JOSEPH F. KLEIN, D.E.,
Professor of Mechanical Engineering.
357 Market Street, Bethlehem.

CHARLES L. THORNBURG, C.E., PH.D.,
Professor of Mathematics and Astronomy,
and Secretary of the Faculty.
308 Packer Avenue, South Bethlehem.

WILLIAM C. THAYER, M.A.,
Professor of the English Language and Literature.
59 Market Street, Bethlehem.

WILLIAM SUDDARDS FRANKLIN, M.S.,
Professor of Physics and Electrical Engineering.
127 Wall Street, Bethlehem.

LANGDON C. STEWARDSON, B.A.,
Professor of Philosophy.
138 Church Street, Bethlehem.

JOHN L. STEWART, PH.B.,
Professor of History and Economics.
Ostrum Street, South Bethlehem.

ROBERT W. BLAKE, M.A.,
Professor of the Latin Language and Literature.
Seneca Street, South Bethlehem.

CHARLES J. GOODWIN, PH.D.,
Professor of the Greek Language and Literature.
315 Packer Avenue, South Bethlehem.

ARTHUR E. MEAKER, C.E.,
Assistant Professor of Mathematics.
542 North Street, Bethlehem.

PRESTON A. LAMBERT, M.A.,
Assistant Professor of Mathematics.
215 South Centre Street, Bethlehem.

JOSEPH W. RICHARDS, M.A., A.C., M.S., PH.D.,
Assistant Professor of Metallurgy, Mineralogy, and Blowpiping.
American Hotel, Bethlehem.

LECTURERS.

WILLIAM L. ESTES, M.D.,
Lecturer on Physiology and Hygiene.
St. Luke's Hospital, South Bethlehem.

ALEXANDER MACFARLANE, M.A., D.SC., LL.D.,
Lecturer on Mathematical Physics.
Chatham, Ont.

INSTRUCTORS.

FREDERICK W. SPANUTIUS, PH.B., M.S.,
Instructor in Qualitative Analysis, Assaying, and Industrial Chemistry.
12 East Fourth Street, South Bethlehem.

WILLIAM B. SCHOBER, PH.D.,
Instructor in Organic Chemistry, Chemical Philosophy and Microscopy.
464 New Street, South Bethlehem.

HERMAN EUGENE KIEFER, A.C., M.S., PH.D.,
Instructor in Geology and Lithology.

ROBERT CULBERTSON HAYS HECK, M.E.,
Instructor in Mechanical Engineering.
422 Cherokee Street, South Bethlehem.

HARRY M. ULLMANN, A.B., PH.D.,
Instructor in Quantitative and Industrial Analysis.
148 South Main Street, Bethlehem.

JOHN HUTCHESON OGBURN, C.E.,
Instructor in Mathematics and Astronomy.
462 Chestnut Street, South Bethlehem.

NATT M. EMERY, M.A.,
Instructor in English, and Registrar.
129 Wall Street, Bethlehem.

CHARLES REED MILLER, A.B., PH.D.,
Instructor in Modern Languages.
430 Chestnut Street, South Bethlehem.

WINTER LINCOLN WILSON, C.E.,
Instructor in Civil Engineering.
21 Wall Street, Bethlehem.

FRANK OLIVER DUFOUR, C.E.,
Instructor in Civil Engineering.
523 Cherokee Street, South Bethlehem.

JOSEPH BARRELL, M.S., E.M.,
Instructor in Geology and Petrology.
Absent on leave.

AMASA TROWBRIDGE, PH.B.,
Instructor in Mechanical Engineering.
310 Wall Street, Bethlehem.

HERMAN SCHNEIDER, B.S.,
Instructor in Civil Engineering.
425 West Fourth Street, South Bethlehem.

ROBERT M. WILSON, M.E.,
Instructor in Electrical Engineering.
440 Cherokee Street, South Bethlehem.

BARRY MacNUTT, E.E., M.S.,
Instructor in Electrical Engineering.
27 South Linden Street, Bethlehem.

JOHN S. VIEHE, E.E.,
Instructor in Electrical Engineering,
28 Market Street, Bethlehem.

E. WILLIAMSON MILLER, B.S., E.M.,
Instructor in Geology and Lithology.
135 North Street, Bethlehem.

EMIL GELHAAR,
Instructor in Freehand Drawing.
148 South Main Street, Bethlehem.

WARREN WORTHINGTON,
Assistant in Metallurgy.
431 Cherokee Street, South Bethlehem.

WILLIAM GUMMERE, A.C.,
Assistant in Chemistry.
501 Seneca Street, South Bethlehem.

THE PACKER MEMORIAL CHURCH.

Chaplain,
REV. LANGDON C. STEWARDSON, B.A.,
138 Church Street, Bethlehem.

Organist,
J. FRED WOLLE,
148 Church Street, Bethlehem.

LIBRARY.

Director,
WILLIAM H. CHANDLER, PH.D.

Cataloguer,
A. W. STERNER.

Shelf Clerk,
PETER F. STAUFFER.

GYMNASIUM.

Instructor,
C. W. SMITH.

THE LEHIGH UNIVERSITY.

ORIGIN.

The Hon. Asa Packer, of Mauch Chunk, during the year 1865, appropriated the sum of $500,000, to which he added one hundred and fifteen acres of land in South Bethlehem, to establish an educational institution in the Lehigh Valley. On this foundation rose The Lehigh University, incorporated by the Legislature of Pennsylvania in 1866. In addition to these gifts, made during his lifetime, Judge Packer by his last will secured to the University an endowment of $1,500,000, and to the University Library one of $500,000.

DESIGN.

The original object of Judge Packer was to afford the young men of the Lehigh Valley a complete education, technical, literary, and scientific, for those professions represented in the development of the peculiar resources of the surrounding region. In furtherance of this purpose instruction is liberally provided in Civil, Mechanical, Mining, and Electrical Engineering, Metallurgy, Chemistry, and in all needful collateral studies. A thoroughly equipped School of General Literature was also established including the Classical and Latin-Scientific courses.

SITE.

South Bethlehem is situated at the junction of the Lehigh Valley, the New Jersey Central, and the Reading (North Pennsylvania) Railroads, and the University buildings are about a half-mile from the station. New York is eighty-seven and Philadelphia fifty-seven miles distant.

The situation of the institution is healthful and beautiful. The region is famous for its mines and its railway and manufacturing enterprises.

TUITION FEES.

The following charges are made for tuition:

For students in the Technical courses, $100 for the entire year, or $60 for either term; for students in the school of General Literature, $60 for the entire year, or $40 for either term. A student who has withdrawn more than one month before the end of either term may make application for the return of a part of the tuition fee; but the amount thus refunded will in no case exceed one half of the last instalment paid to the Treasurer.

These fees include all tuition, with the use of the Library and Gymnasium, but the student is charged for materials and apparatus consumed in the Laboratories.

All fees for tuition are payable to the Treasurer of the University in two instalments. The first instalment, of $60, is to be paid to the treasurer of the University on or before October 10; the second, of $40, on or before February 10. For students in the school of General Literature, the instalments are $40 and $20, respectively.

Students who fail to pay tuition fees when due will be notified that their attendance at college exercises must be discontinued until payment is made.

Every candidate for a degree is required to pay a graduation fee of $10.

The tuition fee of students entering the University in June, 1901, and thereafter in the departments of Civil Engineering, Mechanical Engineering, Electrical Engineering, Mining Engineering, Metallurgy, and Geology will be $125.

POSTPONEMENT OF PAYMENT.

Students who give satisfactory evidence of the impossibility of paying tuition may have the privilege of postponing payment until after graduation or leaving the University. The recipient of this privilege signs a paper declaring it to be his intention to pay the amount of the tuition fees thus remitted in case he should ever be able to do so. He does not in this way accept a benefaction, but assumes a moral obligation which is individual in character and does not affect any member of his family. A necessary condition of granting this privilege is that the applicant shall enter the University in full standing in his studies,

and its renewal from year to year will depend on the maintenance of good scholarship and good conduct. This system of postponing payment supersedes the system of scholarships formerly in use.

PUBLIC WORSHIP.

Morning prayers are held in the Packer Memorial Church of the University, at which attendance is required.

Divine service is held every Sunday morning in the church. Any student who may desire to attend some other place of worship will be permitted to do so upon the request of his parent or guardian or, if he be 21 years of age, upon his own request. The request for such permission should be renewed at the beginning of each year. Attendance, either at the Packer Memorial Church or at the church of his selection, is required of every student.

BUILDINGS.

PACKER HALL.

This building, completed in 1869, is four stories in height, 215 feet long, and 60 feet in width. It is built of Potsdam sandstone in the English Gothic style of architecture, and occupies a commanding position, overlooking Bethlehem, West Bethlehem, and South Bethlehem.

The department of Civil Engineering has, on the first floor, two drawing rooms and three lecture rooms, together with instrument rooms and offices. Here are found collections of bridge models, photographs and blue-prints, specimens of building materials. and also a large number of levels, transits, and other surveying instruments. The testing laboratory in the basement has three machines for tests of tension, compression, flexure, and torsion; a 2000-pound cement machine, and smaller apparatus for special experiments on beams and columns. The cement laboratory has recently been enlarged and its equipment made very complete. The Freshman drawing room of the Civil Engineering department is located on the fourth floor.

The second floor of this building is devoted to the class room and drafting work of the department of Mechanical Engineering. Here are the various recitation rooms, and the well lighted and equipped drafting rooms for the several classes. Near these are

the offices of the professor and instructors, the blue-print room, and the reference library of the department, with its large store of prints and working drawings. A wide range of machinery is illustrated by cuts and photographs on the walls. The drafting rooms are further equipped with an extensive assortment of machine parts in cases, with a full-sized link-motion constructed for Lehigh Valley Railroad practice. and with a small eight-wheel locomotive, which is an exact reproduction on a scale of one-sixth of a standard passenger locomotive.

On the third and fourth floors are to be found the lecture and drawing rooms of the department of Mining Engineering and Geology, the museum of geology and natural history, and other class rooms.

This building contains also the lecture and recitation rooms of the departments of Greek, Latin, Modern Languages and Mathematics.

THE CHEMICAL AND METALLURGICAL LABORATORY.

This is a thoroughly fire proof building, built of sandstone, 219 feet in length by 44 in width.

In the Chemical department there are two principal stories and a basement. The upper floor is occupied by the quantitative and the qualitative chemical laboratories, the former accommodating 48 and the latter 84 students. These rooms are 22 feet in height, and are well lighted and ventilated. A laboratory for industrial chemistry and the supply room are also on this floor.

The first floor contains a large lecture room, a recitation room, a chemical museum, and laboratories for organic, physiological, agricultural, and sanitary chemistry.

In the basement is the large laboratory for the furnace assay of ores and a well appointed laboratory for gas analysis, also rooms containing the apparatus for several processes in industrial chemistry, the engine and air pump for vacuum filtration, etc.

A photographic laboratory is located in the third story of the central portion of the building.

The Metallurgical department contains a lecture room, a blowpipe laboratory for class instruction in blowpipe analysis and in the practical determination of crystals and minerals; a museum for mineralogical and metallurgical collections; a mineralogical laboratory provided with a Fuess reflecting goniometer, a polari-

scope, a Groth's "universal apparat," and a Rosenbusch polarizing microscope; a dry laboratory provided with furnaces for solid fuel and for gas with natural draught and with blast, and a wet laboratory for ordinary analytical work. It is arranged for the instruction of classes in the courses of mineralogy, metallurgy, and blowpipe analysis of the regular curriculum, and to afford facilities to a limited number of advanced students for familiarizing themselves with the methods of measurement and research employed in mineralogy and metallurgy, and for conducting original investigations in these departments of science.

THE PHYSICAL LABORATORY.

This is a stone building, 235 feet long, 44 feet wide, and four stories high. On the first floor are the dynamo laboratory, the workshop, the battery room, and research rooms for thesis work. The dynamo laboratory is provided with a 50 horse-power steam engine and is well equipped with electrical machinery and measuring instruments. In the workshop a 6 horse-power electric motor drives three lathes, a drill-press, an emery grinder, and a buzz-saw; and an 80-cell storage battery is installed in the battery room.

On the second floor are the designing room, the beginnings of an electro-technical museum, the electrical laboratories, and a department library and reading room.

On the third floor are the physical lecture room, with apparatus rooms adjoining, a large audience hall, and recitation rooms; and on the fourth floor are the laboratories for general physics, light, and photography, and two recitation rooms.

CHRISTMAS HALL.

In this building are found the drawing rooms of the Metallurgical department and the Young Men's Christian Association hall. On the ground floor is a Supply Bureau conducted by students of the University.

SAUCON HALL.

Extensive alterations to this building were made in 1896, adapting it to the needs of the departments of English and of History and Economics. It contains a study and a recitation room for each instructor, a lecture hall seating 170 persons, a

large room on the ground floor which has been fitted up for the use of the Debating Societies, with committee rooms adjoining, and the offices of the BROWN AND WHITE.

THE SAYRE OBSERVATORY.

The Sayre Observatory, the gift of Robert H. Sayre, Esq., of South Bethlehem, contains an equatorial and a zenith telescope, transit instrument, and astronomical clock.

THE PACKER MEMORIAL CHURCH

is the munificent gift of Mrs. Mary Packer Cummings, daughter of the Founder of the University. It is one of the largest and most magnificent churches in the State.

THE UNIVERSITY LIBRARY.

To the east of Packer Hall is the University Library, erected by the Founder in memory of his daughter, Mrs. Lucy Packer Linderman.

THE GYMNASIUM

is a spacious structure, built and equipped with the utmost thoroughness. It is furnished with the best patterns of gymnastic apparatus and two bowling alleys, and is provided with hot and cold water, tub, sponge, and shower baths, and 500 clothes closets.

EXPENSES.

Books, materials, paper, pencils, materials used in the laboratories, and drawing instruments are furnished by the student. Materials consumed in the laboratories can be obtained from the University, their value being covered by a deposit or fee made at the opening of that term in which the laboratory work is to be done. These fees and deposits for the various laboratories are given under the detailed statement of laboratory courses in the List of Studies.

Rooms and board cannot be had in University buildings, but can readily be obtained in many private houses in South Bethlehem and Bethlehem.

The following is an estimate of the necessary expenses for the collegiate year, clothing and traveling not included:

Tuition, ...	$100	$100
Board for 36 weeks, . . .	from 108 to	180
Room-rent, with fuel and lights .	40 "	80
Care of room and use of furniture, .	5 "	20
Washing and incidentals, . . .	20 "	40
Books, stationery, etc., . . .	25 "	50
Total, ...	$298 to	$470

In case of students in the School of General Literature, the charge for Tuition is $60, and the totals are $258 to $430.

Fee for Special Examinations.—Special examinations, granted by the Faculty to students at their request, are subject to a fee of five dollars, which is added to the President's Fund for the aid of indigent students.

ADMISSION OF STUDENTS.

The Register is intended to give all necessary information concerning the admission of students. Application may be made to the Registrar if information is desired which is not given in the Register.

DATE OF EXAMINATIONS.

Examinations for admission to the University will be held in 1900 on Thursday, Friday, and Saturday, June 21, 22, and 23, and on Saturday, Monday, and Tuesday, September 22, 24, and 25. All applicants must be in attendance at 8:30 o'clock on the morning of the first day.

The examinations are held in June and September in the following order:

First Day.—Geometry, 8:30 A.M.; Physics, 2 P.M.; Latin and Roman History, 2 P.M.

Second Day.—Algebra, 8.30 A.M.; American History, 2 P.M.

Third Day.—Trigonometry, 8.30 A.M.; English, 11 A.M.; German or French, 2 P.M.; Greek and Greek History, 2 P.M.

Examinations are also held for admission to the Freshman Class at the beginning of the second term and for admission to the Sophomore Class at the beginning of the first term; information as to these examinations may be obtained from the Registrar.

The examinations are rigorous and cover the entire ground laid down in the following scheme. They are all conducted in writing, supplemented by an oral examination at the option of the examiner.

Each candidate for admission must be at least sixteen years of age, and must present a testimonial of good moral character from his latest instructor, or from some reputable citizen of the community in which he lives.

THE SCHOOL OF GENERAL LITERATURE.

THE CLASSICAL COURSE.

Candidates for admission to the classical course are examined in the following subjects:

1. *English.*—This requirement includes: (*a*) English Grammar, especial attention being given to the analysis and correction of sentences; and (*b*) Rhetoric and Composition. Any High School Rhetoric, such as those of Hart, Hill, Williams, Kellogg, and others of a like grade, will be sufficient, together with practical exercises in composition.

Greater stress will be laid, year by year, upon accurate and idiomatic use of the vernacular, upon correct pronunciation, clearness and facility in expression and in the presentation of ideas, an acceptable style in writing—in short, upon all that may fairly be expected of the student as the result of a thorough and intelligent preparation in English. To gain this end, it may be well to use the list of books suggested by the Joint Committee of Colleges and Preparatory Schools for admission to the colleges of the Middle States. These are for 1900:

Dryden's Palamon and Arcite; Pope's translation of the Iliad, Books I, VI, XXII, and XXIV; Addison's Sir Roger de Coverley Papers; Goldsmith's Vicar of Wakefield; Scott's Ivanhoe; De Quincey's Flight of a Tartar Tribe; Cooper's Last of the Mohicans; Tennyson's Princess; Lowell's Vision of Sir Launfal; Shakespeare's Macbeth; Milton's Paradise Lost, Books I and II; Burke's Speech on Conciliation with America; Macaulay's Essays on Milton and Addison.

From one of the last four books in the list a theme will be taken for the composition which forms a part of the examination paper.

The books suggested for 1901 are as follows:—

Tennyson's Princess; Shakespeare's Merchant of Venice; George Eliot's Silas Marner; Addison's Sir Roger de Coverley Papers; Coleridge's Ancient Mariner; Pope's Translation of the Iliad, Books I, VI, XXII, and XXIV; Goldsmith's Vicar of Wakefield; Cooper's Last of the Mohicans; Scott's Ivanhoe; Burke's Speech on Conciliation with the American Colonies; Shakespeare's Macbeth; Milton's Minor Poems; Macaulay's Essays on Milton and Addison.

2. *History.*—This requirement includes (*a*) *American History,* with special reference to the elements of civil government. McMaster's school text-book and Fiske's Civil Government may serve to indicate the amount and character of this requirement. Geographical knowledge, to be tested by reference to an outline map, will form part of the examination in this subject. (*b*) *Greek History,* to the death of Alexander. Myers or Fyffe recommended. (*c*) *Roman History,* to the death of Commodus. Myers or Creighton recommended. Throughout this examination special emphasis will be laid on knowledge of the physical and political geography of the countries concerned.

3. *Algebra.*—Fundamental principles. Factoring. Least common multiple. Greatest common divisor. Fractions. Involution. Radicals. Imaginary quantities. Equations of the first and second degrees. Ratio. Proportion and progressions.

4. *Plane Geometry.*—Fundamental principles. Rectilinear figures. The circle. Proportional lines and similar figures. Comparison and measurement of the surfaces of rectilinear figures. Regular polygons. Measurement of the circle. Maxima and minima of plane figures, and plane and polyhedral angles.

Candidates must have a knowledge of the metric system and be prepared to solve problems in either Algebra or Geometry involving the use of metrical units.

5. *Latin Grammar.*

6. *Caesar,* four books of the Gallic war.

7. *Cicero,* six orations, including the four against Catiline.

8. *Vergil,* the first six books of the Aeneid, including Prosody.

9. The translation, at sight, of passages from Caesar and Cicero.

10. The translation of English into Latin.

11. *Greek Grammar.*

12. *Xenophon,* Anabasis, four books.

13. *Homer,* Iliad, first three books, including Prosody. The Catalogue of Ships may be omitted.

14. The translation, at sight, of a passage from some work of Xenophon.

Candidates for admission to the Classical Course who have had, in their preparatory schools, no opportunity of studying Greek, are, at present, admitted to that course in full standing upon presenting an amount of German or French equivalent to two years' work. They will begin in Greek in the University and study it throughout the course.

THE LATIN-SCIENTIFIC COURSE.

Candidates for admission to this course must present the first ten of the above requirements, but substitute for the Greek sections (numbers 11-14 inclusive) the following work:

15. *Solid Geometry.*

16. Two Years' Work in either German or French. This requirement will be satisfied by the completion of an amount of German equivalent to Part I of Joynes-Meissner's or Calvin Thomas's Grammar, and Buchheim's Reader, Part I, together with about 500 pages of standard German authors; or, if French is offered, an amount equivalent to Whitney's Practical Grammar and Super's Reader, together with about 800 pages of modern French authors.

The candidate is expected to have acquired the ability to read German or French prose and poetry of ordinary difficulty. His proficiency will be tested by questions on Grammar, by translation of simple English sentences into German or French, and by translations at sight of passages containing no rare or unusual words.

THE SCHOOL OF TECHNOLOGY.

Candidates for admission to the Courses in Civil Engineering, Mechanical Engineering, Mining Engineering, Metallurgy, Electrical Engineering, Chemistry, and Geology, are examined in the following subjects:

1. *English.*—This requirement incudes: (*a*) English Grammar, especial attention being given to the analysis and correction of sentences; and (*b*) Rhetoric and Composition. Any High School Rhetoric, such as those of Hart, Hill, Williams, Kellogg, and others of a like grade, will be sufficient, together with practical exercises in composition.

Greater stress will be laid, year by year, upon accurate and idiomatic use of the vernacular, upon correct pronunciation, clearness and facility in expression and in the presentation of ideas, an acceptable style in writing—in short, upon all that may fairly be expected of the student as the result of a thorough and intelligent preparation in English. To gain this end, it may be well to use the list of books suggested by the Joint Committee of Colleges and Preparatory Schools for admission to the colleges of the Middle States. These are for 1900:—

Dryden's Palamon and Arcite; Pope's translation of the Iliad, Books I, VI, XXII, and XXIV; Addison's Sir Roger de Coverley Papers; Goldsmith's Vicar of Wakefield; Scott's Ivanhoe; De Quincey's Flight of a Tartar Tribe; Cooper's Last of the Mohicans; Tennyson's Princess; Lowell's Vision of Sir Launfal; Shakespeare's Macbeth; Milton's Paradise Lost, Books I and II; Burke's Speech on Conciliation; Macaulay's Essays on Milton and Addison.

From one of the last four books in the list a theme will be taken for the composition which forms a part of the examination paper.

The books suggested for 1900 are as follows:—

George Eliot's Silas Marner; Addison's Sir Roger de Coverley Papers; Coleridge's Ancient Mariner; Pope's Iliad, Books I, VI, XXII, and XXIV; Goldsmith's Vicar of Wakefield; Cooper's Last

of the Mohicans; Scott's Ivanhoe; Burke's Speech on Conciliation with the American Colonies; Shakespeare's Macbeth; Milton's Minor Poems; Macaulay's Essays on Milton and Addison.

It is recommended that candidates have a knowledge of Latin Grammar, although an examination in it is not required for any courses except the Classical and the Latin-Scientific.

2. *American History,* with special reference to the elements of civic government.

[McMaster's school text-book and Fiske's Civil Government may serve to indicate the amount and character of this requirement. Geographical knowledge, to be tested by a reference to an outline map, will form part of the examination in this subject.]

3. *Algebra.*—Fundamental principles. Factoring. Least common multiple. Greatest common divisor. Fractions. Involution. Evolution. Radicals. Imaginary quantities. Equations of the first and second degrees. Ratio. Proportion and progressions.

4. *Geometry.*—Fundamental principles. Rectilinear figures. The circle. Proportional lines and similar figures. Comparison and measurement of the surfaces of rectilinear figures. Regular polygons. Measurement of the circle. Maxima and minima of plane figures, and plane and polyhedral angles. Solid geometry.

Candidates must have a knowledge of the metric system and be prepared to solve problems in either Algebra or Geometry involving the use of the metrical units.

5. *Plane Trigonometry and Logarithms.*—Through the solution of right and oblique triangles.

[Wells's New Plane and Spherical Trigonometry and Crawley's five-place Logarithmic Tables are used in the University and are recommended for preparation, but their use is not obligatory.]

6. *Elementary Physics.*—Especial stress is laid upon the candidate's acquaintance with physical phenomena and with the simpler applications of physical laws. The ability to solve advanced or complicated mathematical problems is not required. The character of the examination is indicated by the set of questions given in this Register under the heading "Entrance Examination Papers."

[Nichols's Outlines of Physics, Gage's Elements of Physics, or Avery's Elements of Natural Philosophy (revised edition).]

7. *German.*—This requirement will be satisfied by the completion of an amount equivalent to Part I of Joynes-Meissner's or

Calvin Thomas's Grammar, Buchheim's Reader, and additional reading.

[An equivalent amount of French will be accepted in cases in which it is inconvenient for the candidate to offer German. The amount thus required in French is equivalent to Whitney's Practical Grammar and Super's Reader, with additional reading.]

The candidate is expected to have acquired the ability to understand simple German (or French) prose, by the careful reading of about two hundred duodecimo pages, in adition to the study of Grammar. His proficiency will be tested by questions on the rudiments of grammar, by translations of simple English sentences, and by translations at sight of passages of easy German (or French) prose, containing no rare words.

DIVISION OF EXAMINATIONS FOR ADMISSION.

Candidates for admission to the Freshman Class may pass all the examinations in June, or all in September, or some in June and the rest in September, or may take them in *two consecutive years*. In the last case, for all courses candidates may present themselves for examination in the first year in the following subjects: Plane Geometry, English, and History. In addition, candidates for the Classical and Latin-Scientific Courses may present Latin: Grammar, Cæsar and Cicero, and one of the following: (*a*) Greek: Grammar and three books of Anabasis; (*b*) German: the equivalent of one year's work; (*c*) French: the equivalent of one year's work.

Candidates intending to enter the University in September are advised to present themselves for examination in June; if they are not fully prepared at that time they will receive credit for the examinations then satisfactorily passed.

SPECIAL STUDENTS.

Mature young men who do not desire to take a full regular course, may select special courses, with the approval of the Faculty.

ADMISSION TO ADVANCED STANDING.

Candidates for admission to advanced studies in any course are required to pass, *in addition to the entrance examinations for that course*, examinations in the work already done by the classes which they desire to enter. These examinations are held on the

same days as those for entrance to the Freshman Class. The additional subjects may be found in the schedule of studies of the different departments.

Students from other colleges will be admitted without entrance examinations, and their standing will depend upon the work which they have satisfactorily completed. But owing to the absence of uniformity in college courses, the class standing cannot always be determined on this basis. A personal conference with the head of the department concerned is necessary in order that the student's course on entering the University may be arranged.

ADMISSION TO GRADUATE COURSES.

Students of this University who have taken their *first* degree, and others, on presenting a diploma of an equivalent degree conferred elsewhere, are admitted to advanced studies, according to the plan to be found in the Register under the general subject of Graduate Courses.

PREPARATORY SCHOOL CERTIFICATES.

The University has no permanent arrangement with any preparatory school whereby certificates are accepted in lieu of entrance examinations, and the acceptance of certificates for any student in any subject must be the result of a special arrangement between the Principal of the school and the Secretary of the Faculty of the University. It is, however, regarded as highly desirable that the examiners should receive from principals of preparatory schools statements with reference to those whom they send as candidates for entrance, indicating as clearly and fully as possible, in each case, the teacher's opinion of the candidate's character and scholarship and fitness for entering upon collegiate work; and such statements will receive careful consideration, in connection with the results of the entrance examinations.

EXAMINATIONS AT SCHOOLS.

When desired by the Principals, arrangements will be made to hold entrance examinations to the University at the schools.

LIST OF STUDIES.

Following is a complete list of studies offered by the University in its various courses. The number of exercises per week in each subject is indicated by the figure in parentheses. Two hours of drawing, three of work in the laboratory, or three of practice in the field, are regarded as equivalent to a recitation or lecture of one hour's duration.

PHILOSOPHY.

PROFESSOR STEWARDSON.

1. PSYCHOLOGY. Lectures on the connection of mental with physiological processes. Cerebral localization. The structure and function of sense organs. The phenomena of sensation. No laboratory work. Text-book: William James's Psychology, school edition. First term. (2)

2. PSYCHOLOGY. The phenomena of reason and will. Lectures on association, memory, attention, imagination, apperception, reflection, volition. Text-book: William James's Psychology, school edition. Second term. (2)

3. HISTORY OF PHILOSOPHY. Lectures on Greek philosophy and medieval philosophy with recitations. Text-book: Weber's History of Philosophy (translated by F. Thilly). First term. (2)

4. HISTORY OF MODERN PHILOSOPHY, with special attention to Ethics. Readings from Locke, Berkeley, and Hume. Text-book: Weber's History of Philosophy. Second term. (2)

5. PHILOSOPHY OF RELIGION. This course consists of from twelve to fourteen lectures and is designed to give the students an oversight of the more important religions of the world, together with an insight into the essential character of religion and the main lines of development. Second term. (1)

ECONOMICS.

PROFESSOR STEWART.

6. ECONOMICS. A study of the elementary principles of political economy. Lectures and required reading in selected treatises. First term. (1)

7. Economics. Practical economic problems: the tariff, the money question, the labor problem, trusts and monopolies, etc. Second term. (1)

8. Economic History. History of the industrial changes in England in the 17th and 18th centuries, and the economic development of England and the United States in the present century. First term. (2)

10. Economics. Development of economic thought with especial reference to the doctrines of the English Classical Economists. Second term. (2)

11. Politics. A study of the political organization of the United States, England, Germany and France. Comparison of the nature and scope of the executive, legislative, and judicial organs. Firt term. (1)

11a. Politics. Continuation of Course 11. First term. (1)

12. Politics. History of theories of government. Study of the nature and extent of powers of government. Relation of the state to industrial action. Second term. (1)

12a. Politics. Continuation of Course 12.

13. Law. A study of some legal notions with special reference to contracts and business relations. Second term. (1)

HISTORY.

PROFESSOR RINGER.

14. European History. Political History of Europe from Congress of Vienna, 1815, to Congress of Berlin, 1878. Second term. (2)

PROFESSOR STEWART.

15. American History. A study of the struggle of Europe for America, the different colonial enterprises, the growth of the English power in North America, and the War for Independence. Second term. (2)

16. American History. The establishment of the Federal Republic, the adoption of the Constitution of 1787, the rise of political parties, the struggle for neutrality, the opening of the West to settlement. First term. (2)

17. American History. The slavery agitation, the industrial development, the Civil War, reconstruction, changing of political lines, rise of new issues, the new territorial expansion. Second term. (2)

LANGUAGES.

LATIN.

PROFESSOR BLAKE.

18. Cicero. De Senectute. Livy. Books XXI and XXII, with sight reading from Book I. Latin Prose Composition. First term. (4)

19. Horace. Odes and Epodes. Selections from minor poets of republican period. Cicero. De Amicitia. Latin Prose Composition. Second term. (5)

20. Tacitus. Germania and Agricola. Pliny. Selected Letters. Sight reading from Aulus Gellius. First term. (3)

21. Horace. Satires, Epistles, and Ars Poetica. Second term. (3)

22. Cicero. De Oratore. History of Roman oratory. Second term. (2)

23. Terence. Andria or Adelphi. Plautus. Captivi and Trinummus. Seneca. Octavia. First term. (3)

24. Juvenal. Selected Satires. Martial. Selections. Sight reading from Suetonius. Second term. (3)

25. Lucretius. Book I entire and selections from the other books. Discussion of ancient materialistic theories. First term. (2)

26. Roman Law. Elementary course. Selections from the Institutes of Justinian. Morey's Outlines of Roman Law. Second term. (2)

GREEK.

PROFESSOR GOODWIN.

27. Xenophon. Oeconomicus or Hellenica. Grammar and Prose Composition. First term. (4)

28. Herodotus. Selections with sight reading. Grammar and Prose Composition. Second term. (4)

29. Lysias. Selected Orations. Prose Composition. First term. (3)

30. EURIPIDES. Alcestis, Hippolytus, or Bacchae. Prose Composition. Second term. (3)

31. DEMOSTHENES. Olynthiacs and Philippics, or Oration on the Crown; or THUCYDIDES. Selections. Second term. (2)

32. SOPHOCLES. Oedipus Tyrannus or Antigone. First term. (3)

33. PLATO. Apology, Crito, and Euthyphro, or Phaedo. Second term. (3)

34. ARISTOPHANES. Clouds, Frogs, or Birds. First term.(2)

35. AESCHYLUS. Agamemnon; or PINDAR. Selected Odes. Second term. (2)

36. HELLENISTIC GREEK. New Testament. Selections from Lucian. To be substituted on occasion for 35. Second term. (2)

FRENCH.

PROFESSOR RINGER, DR. MILLER.

37. ELEMENTARY FRENCH. Whitney's French Grammar. Super's French Reader. First term. (2)

38. ELEMENTARY FRENCH, CONTINUED. Grammar and Reader. Dictation. Reading of short stories from different authors. Second term. (2)

39. FRENCH PROSE. Brief review of the Grammar. Reading of Le Cachet Rouge, deVigny; Sans Familie, Malet; La Mare au Diable, George Sand. Dictation. First term. (3)

40. FRENCH PROSE. Selections from modern authors and some readings of Molière, Corneille, and Racine. Dictation. Second term. (3)

(Courses 39 and 40 are for Freshman year of those who entered on French.)

41. FRENCH PROSE. Dictation. French Composition. Translation from English into French. Reading some of the most renowned tragedies of Racine and Corneille. First term. (2)

42. FRENCH LITERATURE. Lectures on French Literature based on Brunetière's Manuel de l'Histoire de la Litterature Française. Selections from Victor Hugo, Lamartine, Musset, and the modern historians. Second term. (2)

43a. Advanced French. Historical Grammar. History of the French Language. Composition. First term. (2)

43b. French Literature. Lectures in French on the literature of the 18th century, with special reference to the Encyclopedists. Composition. Second term. (2)

44a. French Literature. Lectures in French on the French Dramatists. First term. (2)

44b. French Literature. Lectures in French on the Historians of the 19th century up to the Romantic School. Second term. (2)

An optional course in conversational French is open to students of all classes. (1)

GERMAN.

PROFESSOR RINGER, DR. MILLER.

45. Elementary German. Joynes-Meissner's Grammar. Joynes's German Reader. First term. (2)

46. Elementary German, Continued. Joynes-Meissner's Grammar. Dictation. Reading of short stories from different authors. Second term. (2)

46a. German. Continuation of 46. Second term. (1)

47. German Prose. Brief review of the Grammar. Jageman's Prose Composition, with grammatical explanation. Dictation. Reading of short stories by different authors. First term. (3)

48. German Prose. Reading of Freytag's Aus dem Staat Friedrichs des Grossen, and some of the masterpieces of Lessing, Schiller, and Goethe. Second term. (3)

(Courses 45 and 46 are for Freshman year of those who entered on German.)

49. German Prose. Jageman's Prose Composition. Dictation. Translation from English into German. Reading of the dramatic masterpieces of Lessing, Schiller, and Goethe, and the poems of Heine. First term. (2)

50. German Literature. Lectures on German Literature based on Scherer's History of the German Literature. Original compositions. Reading of German Classics. Second term. (2)

51a. Advanced German. Advanced Grammar. History of the German Language. Composition. First term. (2)

51b. GERMAN LITERATURE. Lectures in German on Lessing and Herder. Composition. Second term. (2)

52a. GERMAN LITERATURE. Lectures in German on Schiller and Goethe. First term. (2)

52b. GERMAN LITERATURE. Lectures in German on the Dramatists and Historians of the 19th century. Second term. (2)

An optional course in conversational German is open to students of all classes. (1)

ENGLISH.

PROFESSOR THAYER, MR. EMERY.

53. RHETORIC. A composition course based on A. S. Hill's Principles of Rhetoric, involving recitations and weekly themes on assigned subjects. When the subject of Argumentation is reached in the text-book daily debates take the place of written themes. First term. (2)

54. AMERICAN LITERATURE. Lectures on the basis of Pattee's History of American Literature. Text-book to be read by the student in sections as assigned. The examination is based upon the text-book and the student's note-book. First term. (1)

55. HISTORY OF THE ENGLISH LANGUAGE. Lectures and classroom work, with the use of Lounsbury's History of the English Language as a text-book, supplemented by Emerson's and Champneys's. Second term. (2)

56. ENGLISH LANGUAGE. Discussion of subjects allied with Course 55. Second term. (1)

57. ENGLISH LITERATURE. Lectures and recitations, with parallel readings assigned annually. Text-book: Stopford Brooke's English Literature. First term. (2)

58. LITERARY CRITICISM. The subject varies annually. For 1900 it will be a critical study of two plays of Shakespeare, one an historical play, the other a comedy; preceded by the reading of Thayer's Best Elizabethan Plays, Dowden's Primer of Shakespeare, and Dowden's Shakespeare, His Mind and Art; and supplemented by lectures on the Shakesperean Drama. Second term. (2)

59. ESSAYS, on subjects annually assigned, taken from American authors and requiring the previous reading of some specific work. Six essays a year meet this requirement.

60. Essays, on subjects based on English Literature. Six essays a year meet this requirement.

61. Oratory. A formal course based upon Baker's Principles of Argumentation and Baker's Specimens of Argumentation, with recitations and the writing of Briefs which are then developed into Forensics. First term. (1)

62. Anglo Saxon. Bright's Anglo Saxon Reader, with lectures on early English Literature, and readings from Brooke and Earle. First term. (3)

63. English Philology. The principles of the Philology of the English language as developed in the works of Earle, Trench, Morris and Skeat. By a process of elimination the elements derived from Romance and other sources are excluded, and the residuum examined, in vocabulary and grammar, as a Teutonic language; with special reference to the intensive development of the tongue previous to the Age of Chaucer. Preparation required: 62. Second term. (3)

64. Middle English. A critical study of the English of Chaucer, Langland, Wiclif, and Gower; followed by the literary study of selected specimens of their works. For 1900 Corson's Selections from Chaucer's Canterbury Tales, Skeat's edition of The Vision of Piers the Plowman, Wiclif's translation of the New Testament revised by Purvey, and Gower's Confessio Amantis are assigned. First term. (2)

65. Versification, based on Gummere's Handbook of Poetics, Corson's Primer of English Verse and the use of Palgrave's Golden Treasury, Parts I and II, Schelling's Elizabethan Lyrics and Pancoast's Standard English Poems, with practical exercises in verse-composition, is offered for 1900-1901. Second term. (2)

66. The English Novel. An optional course on the Rise and Development of the English Novel is offered for 1900; and one on the English Poets of the Nineteenth Century, for 1901. These are both lecture courses, with private reading assigned; and, if supplemented by a rigid examination, will be taken as equivalent to one term's work in any class above the grade of Freshman. (2)

MATHEMATICS AND ASTRONOMY.

PROFESSOR THORNBURG, ASSISTANT PROFESSOR MEAKER, ASSISTANT PROFESSOR LAMBERT, MR. OGBURN.

67. SOLID GEOMETRY, beginning with Book VII and completing the subject. First term. (2)

67a. TRIGONOMETRY. Plane and Spherical Trigonometry, including mensuration and use of logarithmic tables. First term. (2)

68. ADVANCED ALGEBRA, beginning with theory of quadratic equations and completing the subject as presented in Hall and Knight's Algebra for Colleges and Schools. First term. (3)

68a. TRIGONOMETRY. Spherical Trigonometry, including mensuration and use of logarithmic tables. First term. (1)

69. ANALYTIC GEOMETRY. Graphic representation of loci on cross-section paper, plane and solid analytic geometry. Preparation required: 67 or 68. Second term. (5)

70. ELEMENTARY MECHANICS. Statics and dynamics with solutions of numerous illustrative and practical problems. (Differential Calculus begun.) Preparation required: 69. First term. (5)

71. DIFFERENTIAL AND INTEGRAL CALCULUS. Embracing applications to analytical geometry problems, theory of center of gravity, moment of inertia, together with a short chapter on elementary ordinary differential equations. Preparation required: 70. Second term. (5)

72. ANALYTICAL MECHANICS. Differential equations of motion, treatment of forces in space, free and constrained motion of a particle and of masses, with applications to practical problems. Preparation required: 71. First term. (2)

73. DESCRIPTIVE ASTRONOMY. A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Preparation required: 70; or 69, 164 and 165. First term. (3)

74. PRACTICAL ASTRONOMY. Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illus-

tration of the problems studied. As this study is primarily for civil engineers the sextant and engineers transit are the chief instruments employed in the observational work. Preparation required: 71 and 73. Second term. (2)

FREEHAND DRAWING.

MR. GELHAAR.

75. FREEHAND DRAWING, with especial reference to architecture, construction and machine parts. First term. (2)

CIVIL ENGINEERING.

PROFESSOR MERRIMAN,
MR. WILSON, MR. DUFOUR, MR. SCHNEIDER.

76. PROJECTION DRAWING. The use of instruments. Tracing and Lettering. The descriptive geometry of projections, intersections, and developments. Isometric drawing. Plans, elevations, and sections of simple structural details from actual measurements. Second term. (4)

77. LAND SURVEYING. The theory of computing areas, dividing land, and locating points by coordinates, as also that of the use of surveying instruments. Field work with the level and transit in the determination of heights and distances, and in making surveys of farms. Exercises in map drawing and in the plotting of field notes. Preparation required: 76. Summer Term. Four weeks, beginning June 21st, 1900.

78. CONSTRUCTION. Lectures on timber, stone, mortar, and concrete and on their use in structures. Visits of inspection with written reports on structures. The construction of roads, streets, and pavements with the methods for their drainage and repair. Lectures on the history of engineering. Preparation required: 75, 76. First term. (3)

79. STRUCTURAL DRAWING. Plans, elevations, and sections are made from actual measurements of structures. Problems in stone cutting, including drawings for buttresses, piers, culverts, and arches. The use of water colors. Preparation required: 76. First term. (3)

80. Construction. Lectures on foundations with piles, cribs, coffer dams, and caissons. Visits of inspection, with written reports. Lectures on river and harbor improvements, on tunnels and canals, and on engineering work in progress of construction. Preparation required: 78. Second term. (3)

81. Graphic Statics. Analysis of the stresses in roof trusses by the force polygon. Applications of the equilibrium polygon to simple cases. Analysis of stresses in bridge trusses under dead loads. Preparation required: 70, 76. Second term. (3)

82. Topographic Surveying. The theory and use of the plane table, and of the transit and stadia. Pen topography. Detailed field work in rough country, and the construction of topographic contour maps. Leveling and triangulation. The adjustment of instruments with the investigation of their systematic errors. Preparation required: 77. Summer Term. Four weeks, beginning June 21st, 1900.

83. Strength of Materials. The elasticity and strength of timber, brick, stone, and metals. Theory of beams, columns, and shafts, with the solution of many practical problems. Each student performs twelve experiments in the testing laboratory, which is equipped with 20,000 and 150,000-pound machines for tension, compression, and flexure, a 50,000-inch-pound machine for torsion, a 2000-pound cement machine, and other apparatus for special work. Preparation required: 70, 71. First term. (4)
(A fee of $1.00 is required for this course.)

84. Construction. The theory and design of masonry walls, dams and arches by both graphic and analytic methods. Lectures on cements and mortars, each student making all the standard tests in the laboratory. Visits to cement manufactories and to engineering works, with written reports thereon. Preparation required: 70, 71, 80. First term. (3)

85. Roofs and Bridges. The theory and computation of stress in roof and bridge trusses under dead, live, and wind loads. Locomotive wheel loads on plate girders and bridge trusses. Visits of inspection to bridges, with sketches of details. Preparation required: 70, 81. First term. (4)

86. Perspective. Shades, shadows, and linear perspective. The construction of perspective views of buildings from plans and elevations. Preparation required: 76, 79. First term. (2)

87. Railroad Surveying. Reconnaisance, preliminary and location methods, with the theory of curves and turnouts. Survey of a line, with the preparation of profiles and maps of the final location. The computation of earthwork. Estimates of cost of the located line. Preparation required: 82. Second term. (4)

88. Hydraulics. Hydrostatics and theoretical hydraulics. The flow of water through orifices, weirs, tubes, pipes, and channels. River hydraulics, with measurements of the flow of the Lehigh River. Naval hydromechanics. Hydraulic motors. Irrigation works. Preparation required: 70, 71. Second term. (4)

89. Bridge Design. The design of highway bridges. Sketches of details of bridges in the vicinity. Computations and working drawings from given specifications for a highway bridge of short span, with estimate of its weight. Preparation required: 83, 85. Second term. (3)

90. Architecture. The history of architecture. Sketches of details. Plans and estimates for wooden houses. Preparation required: 86. Second term. (3)

91. Railroads. The construction of the roadbed; including ballast, ties, rails, switches, culverts, cattle guards and other details. Maintenance of way, and the elements of railroad operation. Visits of inspection, with written reports and finished sketches. Preparation required: 84. Second term. (2)

92. Graphic Statics. Analysis of the stresses in roof trusses by the force polygon. Applications of the equilibrium polygon to the discussion of beams and girders. Preparation required: 70. First term. (2)

93. Geodetic Surveying. Elements of the method of least squares and its application to the adjustment of triangulations. The history and theory of the figure of the earth considered as a sphere and as a spheriod. Field work in triangulation, and in azimuth determinations by both the common engineer's transit and the solar transit. Preparation required: 82. First term. (3)

94. Bridge Design. The design of railroad bridges. Sketches of details of bridges in the vicinity. Computations and working drawings are made from specifications for a railroad bridge of short span, and estimates of its weight are prepared. Preparation required: 89. First term. (3)

95. Sanitary Engineering. Systems of water supply, including purification systems, reservoirs, pipe lines, and pumping plants. House drainage. Systems of sewerage, with methods of purifying sewage. Visits of inspection. The investigation and design of tanks, pipe lines, and sewers. Preparation required: 84, 88. First term. (5)

96. Architectural Design. The design of brick and stone houses, including the preparation of plans and specifications. Preparation required: 83, 90. First term. (2)

97. Materials. The materials of construction with reference to inspection and testings. Applications for the theory of elasticity to the determination of true internal stresses. The sources of error in testing, and the rules proposed for their elimination. Preparation required: 83. First term. (2)

98. Heating and Ventilation. Methods of heating buildings with hot air, hot water, and steam. Methods of ventilation by flues and by forced blast. Details of boilers, piping, radiators, and ventilating appurtenances. Preparation required: 88. First term. (2)

99. Hydraulics. Hydrostatics and theoretical hydraulics. The flow of water through orifices, weirs, tubes, pipes, and channels. Naval hydromechanics. Hydraulic motors. Preparation required: 70, 71. Second term. (3)

100. Bridges. Higher structures, including continuous, draw, cantilever, and suspension bridges, also metallic arches. Methods of analysis for statically indeterminate structures. Arches of iron and concrete. Preparation required: 94. Second term. (3)

101. Architectural Design. The design of steel trusses and three-hinged arches for trainsheds. The design of tall steel buildings. Preparation of plans and specifications. Building superintendence. Preparation required: 96. Second term. (5)

102. Theses for Degree of C. E. Candidates for the degree of Civil Engineer select the subjects of their theses in the first term of the Senior year. Advice is given in regard to the plan of work, and references to literature are indicated. Reports concerning the progress of the investigation are made at intervals during the second term. The thesis is regarded as a part of the final examinations of the course.

MECHANICAL ENGINEERING.

PROFESSOR KLEIN, MR. HECK, MR. TROWBRIDGE.

103. Drawing and Machine Design. Tracings and blue prints. Sketches and working drawings of machine pieces. Interpretation of machine drawing by isometric sketches. General views from given details. Sections of stub ends and valve passages. Intersection of boiler flues. Empirical proportioning of machine parts. Second term. (3)

104. Machinery and Electrical Apparatus. Visits of inspection. Examination and sketching of machine parts and of electrical apparatus and machinery. A classified and numbered list of some three hundred and sixty items is given to each student, who makes a written report on them with freehand sketches containing the leading dimensions. The class is divided into sections, which are separately taken into the shops by the instructor, who then indicates the pieces that are to be examined and gives all necessary explanations. For further details see special circulars of the M. E. and E. E. departments. Summer Term. Four weeks, beginning June 21st, 1900.

105. Elements of Machine Design. Proportioning of such machine parts as come under the head of fastenings, bearings, rotating, and sliding pieces, belt and toothed gearing, levers, and connecting rods. First term. (3)

106. Boilers. Description of various types, and of details of construction, staying, setting, etc.; strength of the structure; accessories; fuels and furnaces; operation; wear and tear; visits of inspection to a boiler shop and to a boiler plant. Text-book: Peabody and Miller. First term. (1)

107. Steam Engine. Elementary Thermodynamics, theory of the ideal heat engine, properties of steam and efficiency of the

steam engine. Mechanics of the engine, steam pressures, inertia resistances, turning force diagrams, etc. Valve gears, valve diagrams applied to slide valves, shaft governors and link motion. The steam engine indicator and study of diagrams. Outline of the study of economy, compounding, etc. The descriptive work is supplemented by shop visits. The solution of many graphical and numerical problems is required. Text-book: Holmes' Steam Engine. Second term. (4)

107a. Steam Engine. Shorter course. Second term. (3)

108. Mechanical Technology. Each student is required to give a full written description of the various processes, operations, and tools involved in the production of each one of a series of properly graded examples of patterns, castings, forgings, and finished pieces, which are under construction in the shops at the time and drawings for which have been given to him on entering the shops. The student's work is directed not only by these but also personally by an instructor, who accompanies him in each shop, gives necessary explanations, and tests the extent and accuracy of his knowledge. Four teachers are engaged in this work, one for each shop and section. Summer Term. Four weeks, beginning June 21st, 1900.

109. Mechanics of Machinery. Graphical statics of mechanisms. Determination of the efficiency of a machine and of the forces acting in every one of its pieces and parts. All the problems are given to the students in the form of black prints and consist of a series of suitably graded examples of machinery. In these both frictional and inertia resistances are considered. First term. (2)

110. Graphical Dynamics and Partial Designs of a High Speed Engine. Complete force analysis, first by approximate practical methods and then by methods theoretically exact; action of steam forces, inertia resistances, etc. Preliminary design, consisting of a determination of the most important dimensions for an engine which is to work under given conditions. Second term. (3)

111. Mechanics of Machinery. Machinery of Transmission. Weisbach-Herrmann series: Vol. III, Part I, Section I. This treats of the Mechanics of Machine Parts and determines their

dimensions from considerations of strength and durability. The Introduction is also studied for its excellent analytical presentation of the subject of acceleration. Second term. (3)

112. Thermodynamics. Proof of the fundamental laws; equations of condition for air and superheated steam; the relations between pressure, volume, temperature, work and heat for special changes of state. Establishment of the fundamental equations of thermodynamics and their adaptation to gases and vapors. Application of the results and of graphical methods to technical problems. First term. (3)

113. Kinematics of Machinery. This treats of the constrained motion peculiar to machinery and of the nature and equivalence of mechanisms. As here pursued it consists of a few lectures accompanied by a large amount of work in the drafting room. This work is mainly expended on the construction of centrodes, of inversions and skeletons of mechanisms and also on the preparation of displacement, velocity and acceleration diagrams for a great variety of machines. This is followed by much practice in mass and force reductions, the latter including many forms of inertia resistances and external forces. First term. (5)

114. Design of Special Machinery. Each student is required to design some example of metal working machinery, as a lathe, plane, drill, or milling machine, so as to gain experience in proportioning parts both for strength and stiffness. This design is followed by one for a still more special machine, say, for performing some unusual operation. First term. (4)

114a. Shorter course. First term. (2)

115. Measurement of Power. Indicator practice: taking of diagrams from the engines in the shops and power plants of the neighborhood—selected so as to represent as many types as possible—and working up of the results. To this is added some dynamometer work and one boiler test. First term. (1)

116. Mechanics of Machinery. Cranes, Excavators and Pile Drivers. Chapters VI to VIII, inclusive, of Weisbach-Herrmann's Mechanics of Hoisting Machinery. These recitations are supplemented by visits of inspection. The Locomotive. The descriptive portion of the work is illustrated by drawings from good current practice and includes visits to the L. V. R. R. Repair Shops at South Easton. The mechanics of the locomo-

tive is taken up as fully as time will permit; the subjects touched on are: General proportions, detailed analysis of the forces and inertia resistances, valve gear action, performance of the running gear on curves, etc. Extensive use is made of diagrams showing the fluctuations of the various periodic forces throughout a revolution. First term. (2)

117. Marine Engineering. Description of the various types of tubular and tubulous boilers, details, management, proportions, study of natural and forced draught and circulation; determination of radius of action of steamships. Text-book: Bertin and Robertson's Marine Boilers. First term. (1)

118. Marine Engineering. Ship Drawing. This work consists in laying down and fairing the lines of a vessel that has already been designed; then are made such general drawings as mid-ship section, out-board profile, in-board profile and upper deck plans. First term. (2)

119. Marine Engineering. Ship Calculations. Calculations relating to the forms and dimensions of ships, to their weight and centers of gravity, and to the steering gear. Text-book: Thearle's Theoretical Naval Architecture. First term. (1)

120. Design of Special Machinery. This work is mainly a continuation of course 114. To complete this course there is required an original design for a hoist, or hydraulic press, or an automatic machine used for manufacturing some such article as wire nails. Second term. (5)

121. Design of Special Machinery. An abridgment of course 120. Second term. (2)

122. Measurement of Power. The larger portion of this course is devoted to experimenting with absorption and transmission dynamometers of the friction brake, belt, float and cradle varieties. The students having finished their work in Thermodynamics now make more complete tests of boilers and steam plants. In addition there are duty tests of injectors and small pumps and practice in the analysis of furnace gases. Second term. (1)

123. Mechanics of Machinery. Hoists, Pumps, Compressors, Blowing Engines and Fans. The presentation is that of the Weisbach-Herrmann series. The classroom work is supplemented by suitably timed visits of inspection. Second term. (4)

124. Marine Engineering, (a). Marine Engines. Seaton, Busley, and Sennet and Oram used as reference books. Advanced study of the Multiple-cylinder Engine; discussion of the strength and proportion of the moving parts; determination of the best expansion ratios, and the positions of the cylinders; valve-gears suited to marine types; equalization of the work on the several cranks and balancing of the moving parts.

125 Marine Engineering, (b). Ship resistance and propulsion. Estimate of the eddy, skin and wave resistances of a ship; the design of the propeller and the calculation of the power required to drive the ship. Text-book: Durand. Second term. (2)

126. Marine Engineering. Ship Drawing. The methods of fastening together the different parts of a ship are first taken up and then drawings are made to show the general arrangement of the machinery and the disposition of the cargo. The course is completed by making the preliminary design or Sheer Draught for a new ship. Second term. (2)

The students of the course in Mechanical Engineering during the Junior year read the technical articles of a German fortnightly, entitled "Der praktische Maschinen-Konstructeur." (1)

127. Thesis for Degree of M. E. Candidates for the degree of Mechanical Engineer are required to present theses upon topics connected with mechanical engineering. Drawings and diagrams are required whenever the subjects discussed need such illustration.

METALLURGY AND MINERALOGY.

PROFESSOR FRAZIER, ASSISTANT PROFESSOR RICHARDS, MR. MILLER.

128. Crystallography. Elementary course in Geometric Crystallography with practical exercises in the determination of crystalline forms in models and actual crystals. First term. (2)

129. Mineralogy. Elementary course in physical, chemical and descriptive Mineralogy with practical exercises in the determination of about two hundred of the more common mineral species. Text-book: E. S. Dana's Text-book of Mineralogy Second term. (3)

(A deposit of $5 is required from each student taking courses 128 and 129 to cover damage to collections and instruments and

the value of supplies furnished him. In case the damage consists only of ordinary wear and tear the amount retained to cover it will not exceed $2 for each student.)

130. Blowpipe Analysis. An elementary course in blowpipe analysis considered as a method of chemical qualitative analysis. Illustrative lectures followed by practical testing for thirty-five bases and fifteen acids. Reference book: Elementary Blowpipe Analysis by Landauer. Second term. (1)

131. Blowpipe Analysis. Advanced blowpipe tests and separations. The application of blowpipe methods as primary tests for determining minerals: Text-book: Plattner's "Löthrohrprobirkunst." Sixth German edition, revised by Dr. F. Kolbeck. First term. (1)

132. Blowpipe Analysis. An optional course in quantitative blowpipe analysis, dealing particularly with the determination of gold, silver, cobalt, nickel, copper, lead, tin, bismuth, mercury, and analysis of coal. Reference book: Plattner's "Löthrohrprobirkunst." First term. (1)

(In each of the Blowpipe courses a deposit of $2.00 is required, of which, on an average, $1.00 is retained to cover cost of gas, chemicals and specimens supplied.)

133. Drawing. Tracings and blue prints. Sketches and working drawing of machine pieces. Interpretation of drawings by isometric sketches. General views from given details. Sections of simple construction. Intersections of spheres, cones, cylinders, etc., accompanying the study of descriptive geometry and illustrated from examples of mining and metallurgical plant. Flat tinting with water colors. First term. (4)

Students of the Course in Mining Engineering take one half of 133 in the Freshman year and one half in the Sophomore year.

134. Metallurgical Construction. Examination and sketching of metallurgical plant in the vicinity. General views and working drawing of the plant examined, accompanied by written descriptions of its construction and operation. Second term. (3)

135. Metallurgical Design. Execution of designs accompanied by working drawings and estimates of material and cost for the erection of metallurgical plant under given conditions. Second term. (2)

136. General Metallurgy and the Metallurgy of Iron. General Metallurgy: Metallurgical processes. Transmission of heat. Measurement of high temperatures. Furnaces. Fluxing. Fire proof materials. Principles of thermal chemistry. Combustion. Properties of natural and artificial fuels. Manufacture of gaseous fuels. The Siemens Furnace. Charcoal burning. Coking. The electric furnace.

Metallurgy of Iron: Chemical and physical properties of iron. Iron ores. Preparation of ores. The blast furnace. Remelting in the foundry. Pig washing. Puddling. The Bessemer process. The open hearth process. Cementation. Manufacture of crucible steel. Direct processes. Methods of casting and forging. Second term. (5)

137. Metallurgy of Copper, Lead, Silver, Gold, Zinc, Mercury, and Aluminium. Copper: Chemical and physical properties. Ores. Smelting sulphide ores. The Bessemer process. Treatment of oxide ores. Wet processes. Electrolytic processes. Lead: Chemical and physical properties. Ores. Smelting processes. Condensation of lead fume. Refining and desilverization of base bullion. Silver: Chemical and physical properties. Ores. Smelting with lead. Amalgamation. Leaching processes. Gold: Chemical and physical properties. Ores. Gold washing. Gold milling. Chlorination. The cyanide process. Parting gold and silver. Zinc: Chemical and physical properties. Ores. Belgian and Silesian processes for the manufacture of spelter. Manufacture of zinc oxide. Electrolytic processes. Mercury: Chemical and physical properties. Ores. Processes of extraction. Aluminium: Chemical and physical properties. Ores. Extraction in the electric furnace. First term. (4)

138. Electro-Metallurgy. Lectures on history of electrolysis. Laws of electrolysis. Relation of chemical to electrical energy. Classification of secondary reactions. Classification of electro-metallurgical processes. Details of electro-metallurgy of the metals. Reference book: W. Borchers' Electro-metallurgy. Translation by MacMillan. Second term. (1)

139. Thesis for the Degree of Met.E. Every student in Metallurgical Engineering is required to present a thesis on some topic connected with this subject.

GEOLOGY AND THE NATURAL SCIENCES.

PROFESSOR WILLIAMS, MR. BARRELL.

142. Megascopic Lithology. Determination of the rocks which can safely be distinguished with the pocket lens, supplemented by ordinary chemical and blowpipe tests. Lectures and recitations followed by laboratory work on hand specimens. Preparation required: 129. First term. (3)

143. Megascopic Lithology. Shorter course, embracing only the most common rocks. Lectures, recitations and laboratory work. Preparation required: 129. Second term. (2)

144. Petrology. The optical properties of minerals and their study with the petrological microscope. Recitations and laboratory work. Preparation required: 129. First two months. (2)

145. Petrology. The determination of rocks, their chemical and mineralogical classification and composition, their origin. Recitations and laboratory work with the microscope combined with a study of hand specimens. Preparation required: 144. Last seven months. (2)

A deposit of $5 is required from each student taking courses 144 and 145 to cover wear and tear, which with care need not exceed $2.

146. Geology. A brief course in structural, dynamic, and historic geology for those who desire to pursue the subject as a culture study. Recitations illustrated by suites of fossils and optional work in the field. Preparation required: 129. Second term. (3)

147. Geology. Structural, dynamic, and historic geology. A broader course adapted to the needs of those who will use geology professionally. Lectures, recitations, assigned reading with trips in the field. Preparation required: 129 and 155. Second term. (4)

148. Economic Geology. Theories of the formation of deposits, their structure, geological horizons and geographic distribution. Lectures. Preparation required: 146 or 147. First term. (2)

149. Physiography. The classification of land forms; their stages of development; their dependence on climate, and geo-

graphical distribution. Lectures, assigned reading and field work. Preparation required: 146 or 147. First term. (3) to (5)

151. Geological Surveying. The identification of rocks and tracing of boundary planes under capping. The study of soils. Solution of problems in mapping. Forms of field notes. Recitations and lectures, field work, map drawing. Preparation required: 146 or 147. Second term. (2)

154. Botany. A preliminary course treating of the general scheme of classification. Lectures and references to text-books First term. (1)

155. Zoology. Studies of the structure, development, relationships and habits of the different classes of the animal kingdom. Dissections, sketches and studies in comparative anatomy. Recitations and laboratory work. First term. (3)

156. Biology. A general survey of the principal subdivisions of the Science of Life in its broadest sense. Embryology, Organic evolution. The geological and geographical distribution of organisms. Recitations with a limited amount of laboratory work. Second term. (2)

157. Thesis for the Degree of B.S. (Geol.). Every student in this course who is a candidate for this degree is required to present a thesis on some topic connected with Geology.

DR. ESTES.

158. Hygiene. Lectures on Physiology and Health. First term. (1)

MINING ENGINEERING.

PROFESSOR WILLIAMS, MR. MILLER.

159. Mining Engineering. Prospecting, valuation of property, boring, timbering, shaft sinking. Lectures, references to text-books, monographs and periodicals. Visits to mines. Preparation required: 146 or 147. First term. (3)

160. Mining. Blasting, development of deposits, systems of winning underground and at daylight. Lectures, etc. First term. (2)

161. Mining Engineering. Haulage by track and wire, hoisting, drainage, ventilation and lighting. Lectures, etc. Second term. (2)

162. Mining Engineering. Accidents, their cause, means of prevention, rescue, etc., police of mines, hygiene, rules, and laws. First term. (1)

163. Mining Engineering. Theory of ore dressing. Physical principles on which it depends. Machines used in wet, dry, and magnetic methods, with the order in which they are arranged. The location of dressing works. The preparation of anthracite. Lectures, etc., and visits to dressing works. Second term. (3)

164. Mine Surveying. Location of stations underground. Temporary and permanent side notes. Connecting surface and underground work through shafts or slopes. Mapping by coordinates. Care of maps, and variations due to temperature and moisture. Permanent forms of records. Detection of errors. Rectification of bore holes. Lectures, etc., followed by practice with a mine corps and construction of map from notes of actual survey. Preparation required: 77. First term. (2)

165. Mining Design. The design of mining plant to meet assigned conditions, with detailed working drawings and estimates of cost. Each problem is accompanied by a memoir containing all calculations and descriptions, with which are bound tracings or blue prints of all drawings. Preparation required: 159, 161. First term. (2)

166. Thesis for the Degree of E. M. Candidates are required to present a thesis on some topic connected with this subject.

PHYSICS AND ELECTRICAL ENGINEERING.

PROFESSOR FRANKLIN, DR. MACFARLANE, MR. WILSON, MR. MACNUTT, MR. VIEHE.

167. Elementary Physics. Mechanics. Lectures, recitations, and problem work. Preparation required: 68, 68a. Second term. (3)

168. Elementary Physics. Heat, Electricity and Magnetism begun. Lectures, recitations and problem work. Preparation required: 69 and 167. First term. (3)

169. Elementary Physics. Electricity and Magnetism, Light and Sound. Lectures, recitations and problem work. Preparation required: 168. Second term. (3)

170. Elementary Physical Laboratory. Mechanics and Heat. Preparation required: 167. A fee of $4.00 for use of materials in this course is charged. First term. (1)

171. Elementary Physical Laboratory. Electricity and Magnetism, Light and Sound. Preparation required: 168. Fee $4.00. Second term. (1)

172. Advanced Theory of Electricity and Magnetism. Adapted to those students who devote themselves especially to electrical engineering. The theory of electrical units, the theory of inductance and capacity, the theory of the magnetism of iron, and the electromagnetic theory of light. Preparation required: 167 to 171 inclusive. First term. (4)

173. Electrical Laboratory. Fee $4.00. First term. (1)

174. Electrical Laboratory. Fee $4.00. Second term. (1)

Courses 173 and 174 are adapted to those students who devote themselves especially to electrical engineering. The work consists of measurements of current, resistance, electromotive force, inductance and capacity, the magnetic testing of iron, commercial insulation and conductivity tests, break down tests of insulation and calibration of measuring instruments.

175. Telegraphs and Telephones. Lectures and seminary work. The various systems of electric signalling, such as railroad signalling, and fire alarm and annunciator signalling; the various systems of telegraphy, including wireless telegraphy; telephone systems and appliances. Preparation required: 168 and 169. Second term. (3)

176. Theory of Direct Current Dynamos and Motors. Lectures. Preparation required: 172 and 173. Second term. (3)

177. Design of Direct Current Dynamos and Motors. Preparation required: 172 and 173. Second term. (1)

178. Theory of Direct Current Dynamos and Motors. Continuation of 176. Lectures. First term.(2)

179. Design of Direct Current Dynamos and Motors. Continuation of 177. First term. (2)

180. Theory of Alternating Currents. The principles of alternating currents and the simple theory of alternating current machinery. Preparation required: 172. Second term. (2)

181. Theory of Alternating Currents. Lectures and recitations in the advanced theory of alternating current machinery. Preparation required: 180. First term. (2)

182. Theory of Alternating Current Machinery. Continuation of 181. Lectures. Second term. (2)

183. Design of Alternating Current Machinery. Practical designing of alternating current machinery. Preparation required: 178 and 181. Second term. (2)

184. Electrical Generating Stations for Light and Power. Lectures and Seminary work in the practical design and operation of electrical generating stations for light and power. The seminary reports of the students are based upon outside reading and upon visits of inspection. First term. (2)

185. Electrical Transmission and Receiving Systems. Continuation of course 184. Outside construction work; distributing and receiving apparatus. Second term. (2)

186. Dynamo Laboratory. Direct current. Experimental studies and tests of direct current dynamos, motors, and appliances. Preparation required: 174 and 176. Fee $7.00. First term. (3)

187. Dynamo Laboratory. Alternating current. Experimental studies and tests of alternating current dynamos, synchronous motors, induction motors, rotary converters, transformers, and appliances. Preparation required: 181 and 186. Fee $7.00. Second term. (3)

188. Electrical Laboratory. The simpler and more essential parts of 173 and 174. Fee $4.00. First term. (1)

189. Dynamo Laboratory. The simpler and more essential parts of Courses 186 and 187. Fee $4.00. Second term. (1)

190. Electric Railways. The simpler and more essential parts of courses 184 and 185, the selection being made with special reference to the generation, transmission, and utilization of electric power for railways. Second term. (2)

191. Electric Testing. Two lectures a week during the first half of the term and two afternoons a week in the electrical and dynamo laboratory during the second half of the term. It includes a few of the essential parts of Courses 172, 180, 188, and 189, and is adapted to students who do not have sufficient time to take Courses 180, 188, and 189. Fee $4.00. First term. (2)

192. Complex Quantity. Six lectures on the algebra of complex quantity, with special reference to the applications to alternating currents. First part of second term.

193. Thesis for the Degree of E.E. Every student in Electrical Engineering is required to present a thesis on some topic connected with this subject.

For Summer Terms see courses 104 and 108.

CHEMISTRY.

PROFESSOR CHANDLER, MR. SPANUTIUS, DR. SCHOBER, DR. ULLMANN, MR. GUMMERE.

194. General Introduction to Theoretical Chemistry. Description of the non-metallic and metallic elements and their compounds. Lectures illustrated by experiments, diagrams, working drawings, lantern pictures, and specimens from the museum. Note books on the lectures required. Reference book: Remsen's Inorganic Chemistry, Advanced Course. First term. (2)

195. Chemical Laboratory. Experiments covering a systematic study of the chemical and physical properties of the more important elements and their compounds. First term. (2)

196. Qualitative Analysis. Practical work in the qualitative laboratory, accompanied by lectures. Text-book: Prescott and Johnson's Qualitative Chemical Analysis. Second term. (5)

196a. Qualitative Analysis. Shorter Course. Second term. (3)

197. Stoichiometry. Chemical problems, and reactions. Text-book: Thorpe and Tait's Chemical Calculations. Second term. (2)

198. Chemical Philosophy. Theories of Chemistry; physical and chemical methods of determining atomic and molecular weights, solutions, electrolysis, thermo-chemistry, etc. Text-books: Tilden's Chemical Philosophy; Whitley's Chemical Calculations; Remsen's Inorganic Chemistry, Advanced Course. First term. (3)

199. Quantitative Analysis. Practical work in the quantitative laboratory, accompanied by lectures and recitations. Acidimetry, alkalimetry, chlorimetry, and the determination and analysis of simple chemical compounds. Text-book: Fresenius's Quantitative Analysis, edited by Allen and Johnson. First term. (5)

200. Quantitative Analysis Conference. Discussions concerning the laboratory work of Course 199. First term. (1)

201. Quantitative Analysis. Practical work in the quantitative laboratory. Analysis of simple chemical compounds, ores and metallurgical products. Second term. (4)

202. Quantitative Analysis. Continuation of Course 199. Analysis of minerals, ores, slags, alloys, etc. Text-books: Fresenius's Quantitative Analysis. Second term. (6)

202a. Quantitative Analysis. Shorter Course. Second term. (5)

203. Quantitative Analysis Conference. Discussions concerning the laboratory work of Course 202. Second term. (1)

204. Theoretical Chemistry. The elements and their compounds. Text-book: Remsen's Chemistry, Advanced Course. Second term. (3)

205. Toxicology. Lectures illustrated by experiments and by a large collection of specimens of poisons from the museum of chemistry, and supplemented by a short course of laboratory work on some of the common poisons. First term. (2)

206. Quantitative Analysis. Continuation of Course 202. Ores and alloys; complete analysis of iron and steel; also gas analysis, mineral water analysis, etc. Text-books: Fresenius's Quantitative Analysis, Allen and Johnson, Bunsen's Gas Analysis. First term. (5)

206a. Quantitative Analysis Conference. Discussions concerning the laboratory work of Course 206. First term. (1)

207. Quantitative Analysis. Continuation of Course 201. Analysis of ores and metallurgical products, and gas analysis. First term. (2)

208. Organic Chemistry. Illustrated lectures and recitations. Typical compounds of carbon, their classification, general relations, and methods of converting compounds of one class into those of another. Text-book: Remsen's Introduction to the Study of the Carbon Compounds; Richter's Organic Chemistry, translated by Smith. First term. (4)

209. Organic Chemistry. Practical laboratory work. Determination of specific gravities, melting points, boiling points, vapor densities; also of chlorine, bromine, iodine, and sulphur of organic substances. Combustion analysis, nitrogen determina-

tion, fractional distillation, and the preparation of fifty pure organic compounds. Text-books: Gattermann's Practical Methods of Organic Chemistry, translated by Schober; Levy's Organischer Präparate. Second term. (6)

210. Organic Chemistry Conference. Discussions concerning the laboratory work of Course 209. Second term. (1)

211. Industrial Chemistry. Preparation of a number of chemically pure inorganic salts from minerals, commercial products, etc.; of various dyes and dye mixtures, and the dyeing of cotton, silk and woolen fabrics; calico printing; manufacture of coal gas; fermentation; bleaching. First term. (3)

212. Assaying. Lectures and laboratory practice in the furnace assay of the ores of lead, tin, antimony, gold, silver, and iron; also gold and silver bullion analysis by processes practiced in the United States Mint. Text-book: Rickett's and Miller's Notes on Assaying. First term. (3)

213. Microscopy. Instruction in the use of the microscope. Text book: Bausch's Manipulation of the Microscope. First term. (2)

214. Industrial Chemistry. Lectures on the chemical industries, illustrated by experiments, diagrams, lantern pictures, and specimens from the museum of chemistry. Second term. (3)

215. Industrial Analysis. Analysis of commercial products. Laboratory work. Second term. (3)

216. Industrial Chemistry Conference. Discussions concerning the laboratory work of Course 215. Second term. (1)

217. Agricultural Chemistry. The application of chemistry to problems in agriculture. Laboratory work. Second term. (1)

218. Sanitary Chemistry. Qualitative and quantitative examination of air, water, food, disinfectants, baking-powders, flour, bread, tea, coffee, cocoa, spices, milk, butter, lard, beer, and other subjects connected with this branch of the science. Second term. (1)

219. Thesis for the Degree of A.C. Preparation of a thesis on some subject, approved by the Professor of Chemistry, involving practical work in the laboratory and use of the library, each graduate thus making a contribution to the progress of the science, as a preliminary to the reception of his degree.

Deposits to cover breakage, chemicals, etc., are required in the above course, as follows: Ten dollars each in Courses 195, 213, 215, and 217; fifteen dollars in Course 218; twenty dollars each in Courses 207 and 211; thirty dollars each in Courses 196, 199, 201, 202, 206, and 212; thirty-five dollars in Course 209.

GRADUATE COURSES.

The degree of Master of Arts is conferred upon any candidate, otherwise properly qualified, who, after having taken the degree of Bachelor of Arts at any College or University, shall pursue for at least one year at this University a course of liberal study in two departments (under two professors), pass the examinations of the same and present a satisfactory thesis.

The degree of Master of Science is conferred upon any candidate, otherwise properly qualified, who, after having taken the degree of Bachelor of Science or a degree in technology at any College or University, shall pursue for at least one year at this University a course of advanced study in two departments (under two professors), pass the examination of the same and present a satisfactory thesis.

The tuition fee is $50 per year and the diploma fee is $10. In exceptional cases graduates of this University who are candidates for the degree of Master of Arts may be allowed to study in non-residence; in this event no tuition is charged, but the diploma fee is $30, and at least two years are required to complete the course.

The course of study may be selected, with the approval of the Faculty, from the following list of subjects, at least fifteen exercises per week being chosen in two departments. About two-thirds of the work is to be in one department and about one-third in another, these being called major and minor departments. The thesis is to be prepared on a subject connected with the studies of the major department. The candidate is required to satisfy each professor that he is fully competent to pursue the subjects selected.

The following subjects are offered for the academic year 1900-1901, the numbers in parentheses denoting the exercises per week required of the student. Other allied subjects may in some cases

be selected by candidates after conference with the professors in charge.

Candidates who expect to receive the Master's degree in June of 1901 are required to confer with the professors on or before Sept. 29, 1900, and to present their courses of study to the Faculty for approval on Oct. 1, 1900.

IN SANITARY SCIENCE.

The Mechanical, Chemical, and Biological Purification of Water and Sewage.

PRESIDENT DROWN.

A critical study of the results of the investigations that have been carried on in Europe and in this country during the last fifteen years into the methods proposed and those in use for the removal or destruction of the organic and inorganic impurities of water and sewage whereby this department of sanitary engineering has been put on a scientific basis. Two terms. (4)

IN CHEMISTRY.

Advanced Industrial Chemistry.

PROFESSOR CHANDLER.

This course involves the study of some industry dependent upon chemical principles and consists of practical experimental and analytical work in the laboratories, inspection of manufacturing establishments and study of the technical journals and other publications. Two terms. (10)

The Rare Elements.

MR. SPANUTIUS.

The study of the properties and reaction of these elements and the preparation of some of their salts. Two terms. (10)

Advanced Organic Chemistry.

DR. SCHOBER.

This course consists of original investigations in organic chemistry. Two terms. (10)

Advanced Inorganic Chemistry.

DR. ULLMANN.

Study and comparison of known methods of quantitative analysis and the development of new methods. Two terms. (10)

IN MINERALOGY.

Physical Crystallography.

PROFESSOR FRAZIER.

This course consists of a description and discussion of the physical properties of crystals, especially their optical behavior. Works of reference: Mallard's Crystallographie Physique, Groth's Physikalische Krystallographie, and Liebisch's Physikalische Krystallographie. In addition, practical instruction is given in the determination of the optical constants of crystals. Second term. (5)

Geometric Crystallography.

ASSISTANT PROFESSOR RICHARDS.

The course comprises advanced study in mathematical crystallography, including stereographic and especially gnomonic projection, with the theoretical views of crystallogeny developed by the latter. Further, practical crystal measurements with the two-circle or theodolite goniometer of Goldschmidt, projection of results gnomonically, and discussion of crystallographic constants thus determined. First term. (5)

IN CIVIL ENGINEERING.

Sanitary Engineering.

PROFESSOR MERRIMAN.

The designing of reservoirs, tanks, and pipe lines for water supply systems, and of sewers and other appurtenances for sewerage systems. Inspection of existing plants, with reports thereon. Two terms. (4)

Bridge Design.

PROFESSOR MERRIMAN.

The theory of suspension and arched structures, with the preparation of general plans and estimates, and the economic comparisons of different types. Two terms. (4)

Testing of Materials.

PROFESSOR MERRIMAN AND MR. DUFOUR.

The properties of materials of construction, with special reference to inspection and testing. The student will conduct original researches in the laboratory. The work on the unification of methods of testing done by the International Association for Testing Materials will receive detailed attention. Two terms. (5)

Railroad Engineering.

MR. WILSON.

The economic location of railroads as influenced by probable volume of traffic and cost of operation. A course based on Wellington's treatise, with the detailed discussion of special cases. Two terms. (2)

IN MODERN LANGUAGES.

German.

PROFESSOR RINGER AND DR. MILLER.

An advanced course in the German language and literature, consisting of historical and advanced grammar, and reading. The course will be arranged with each candidate individually upon application. Two terms. (5)

French.

PROFESSOR RINGER AND DR. MILLER.

An advanced course in the French language and literature, consisting of historical and advanced grammar, and reading. The course will be arranged with each candidate individually upon application. Two terms. (5)

IN GEOLOGY.

Geology.

PROFESSOR WILLIAMS.

The identification of rocks and the tracing of boundary planes under capping; the value of fossils in determining zones; the construction of maps and sections; and practice in taking field notes. Field work is done in the vicinity of the University where formations from the Archaean to the Triassic outcrop and where glacial deposits cover the regions to the north. Second term. (6)

The influence of soil and physiography on racial development and on history. Lectures and assigned readings. Second term. (2)

Physiography.

MR. BARRELL.

The classification of land forms; their stages of development; their value as indicators of the geological history of the land; their dependence on climatic and geographic distribution. Lectures, assigned readings and studies in the field. Preparation required: 146 or 147. First term. (3)

Invertebrate Paleontology.

MR. BARRELL.

The study of the characteristic genera of Invertebrates in detail, their structure, mode of life, relationship and geological range. Combined laboratory and class room work, divided as follows:—

a. Zoology.—Preliminary course. First term. (2)

b. Paleontology proper.—Second term. (2)

IN MATHEMATICS AND ASTRONOMY.

Practical Astronomy.

PROFESSOR THORNBURG.

The work embraces: (a) The study of the instruments and methods used in the determination of time, latitude, longitude, and azimuth; (b) Practical work in the observatory, secur-

ing facility in making and reducing observations. Two terms. (4)

Analytical Mechanics.

ASSISTANT PROFESSOR MEAKER.

This course is based on Ziwet's Theoretical Mechanics and Routh's Dynamics of a System of Rigid Bodies. Two terms. (3)

Differential Equations.

ASSISTANT PROFESSOR LAMBERT.

The course in Differential Equations is based on Johnson's Differential Equations and Byerly's Spherical Harmonics. Collateral reading in the University Library is required. Two terms. (3)

IN ENGLISH.

English Literature.

PROFESSOR THAYER.

An advanced course in branches which have not formed a part of the undergraduate work of the candidate, the details of which will be arranged after a personal conference. Two terms. (5)

IN PHYSICS AND ELECTRICAL ENGINEERING.

Theoretical Physics.

PROFESSOR FRANKLIN.

This embraces (a) The theory of heat, based upon Preston's Theory of Heat and Buckingham's Thermodynamics; (b) The theory of electricity and magnetism, based upon Maxwell's Treatise, J. J. Thomson's Recent Researches and Webster's Electricity and Magnetism; (c) The theory of light and sound, based upon Preston's Theory of Light and Helmholtz's Tonempfindungen. Two years. (4)

Theory of Alternating Currents.

PROFESSOR FRANKLIN.

This course is based upon the works of Bedell and Crehore, of Steinmetz, and of Franklin and Williamson. Two terms. (2)

PHYSICAL RESEARCH.

PROFESSOR FRANKLIN.

This course consists of original investigations in experimental physics. Two terms. (3)

ELECTRICAL TESTING.

PROFESSOR FRANKLIN.

This course consists of investigations in electrical engineering. Two terms. (3)

IN PHILOSOPHY.

PHILOSOPHY.

PROFESSOR STEWARDSON.

Introspective and physiological psychology. The History of Philosophy in general, together with special study of either the Greek, German, or English philosophers. Two terms. (5)

IN HISTORY AND ECONOMICS.

POLITICAL ECONOMY.

PROFESSOR STEWART.

This course embraces: (a) The rise and development of economic systems and economic thought; (b) The scope and method of political economy. Patten's Development of English Thought and the works of Keynes, Cohn and Ingram on Political Economy will be used. Two terms. (5)

AMERICAN HISTORY.

PROFESSOR STEWART.

An examination of the influence of the economic development of the Union upon the legal and political theories incorporated in the Constitution. Two terms. (5)

POLITICS.

PROFESSOR STEWART.

The history of the attempt to treat in a systematic way the problems of political organization. Pollock's History of the Science of Politics and Sidgwick's Elements of Politics. Two terms. (5)

IN LATIN.

Roman Law.

PROFESSOR BLAKE.

(a) Roman law before Justinian: based on Bruns' Fontes Juris Romani Antiqui, and Mommsen's Abriss des römischen Staatsrechts. (b) Justinian's Institutes, Morey's Outlines of Roman Law, and collateral reading. Two terms. (4)

Roman Philosophy.

PROFESSOR BLAKE.

(a) Cicero, De Legibus and De Natura Deorum; History of Roman philosophy. (b) Selected readings from Seneca. Two terms. (3)

Roman Literature.

PROFESSOR BLAKE.

(a) History of Roman literature. (b) Readings from Latin authors not previously read in course, as far as practicable paralleling the work in (a). Two terms. (3)

IN GREEK.

Hellenistic Greek.

PROFESSOR GOODWIN.

Gospel of St. Mark, Acts, and selected Epistles of the New Testament. Thayer's Lexicon. Blass's Grammar of New Testament Greek. Patristic literature. Collateral reading. Selections from Lucian. Two terms. (5)

Dramatic Poetry.

PROFESSOR GOODWIN.

Several plays of Aeschylus, Sophocles, Euripides, and Aristophanes. Aristotle's Poetics. Collateral reading. Two terms. (5)

Greek Philosophy.

PROFESSOR GOODWIN.

Plato's Republic and other works. Aristotle, selections. Ritter and Preller's Historia Philosophiae Graecae. Zeller's History of Greek Philosophy, and other collateral reading. Two terms. (5)

SCHOOL OF GENERAL LITERATURE.

Courses having in view a liberal education as distinct from a professional training are provided by the University in this School.

Two such courses are at present offered:

1. The Classical Course.
2. The Latin-Scientific Course.

These courses differ in their entrance requirements and in their respective schedules of studies, it being the general plan that the place occupied by Greek in the Classical Course be filled in the Latin-Scientific Course with an educational equivalent in modern languages and science.

The degree of B.A. is conferred upon the graduates of either course.

In arranging the schedules of studies of these courses it is the purpose of the University to allow students as large freedom in the selection of their work as seems wise and in keeping with the educational purpose of the School. Courses in the English, Latin, German, and French languages and their literatures, in philosophy, history and economics, in physics and chemistry are made obligatory upon all students. For those students who wish to pursue extended courses in literature, philosophy, politics, and science, ample provision has been made in the advanced elective courses in these and related lines. Also for those students who contemplate the study of a profession it is made possible to anticipate in part, often with the saving of considerable time, the work of the professional school by electing such studies as are in the line of the profession.

It has seemed especially desirable that those who purpose pursuing a course in one of the technical schools should have the opportunity of obtaining a broad general education before entering upon their professional training, without unduly increasing the years of study. Accordingly there have been included among the electives of the courses in the School of General Literature many subjects which belong essentially to the technical courses. A graduate of the School of General Literature who has during his course there made the proper elections may by two years of graduate work in any of the technical schools of the University gain the corresponding technical degree.

THE CLASSICAL COURSE.

FRESHMAN YEAR.

FIRST TERM.		SECOND TERM.	
Solid Geom. and Trig., (4)	67, 67a	Analytic Geometry, (5)	69
Greek, (4)	27	Greek, (4)	28
Latin, (4)	18	Latin, (5)	19
Rhetoric and Essays, (2)	53, 59	English Lang., Essays, (3)	55, 56, 59
American Literature, (1)	54		
Hygiene, (1)	158		

SOPHOMORE YEAR.

FIRST TERM.		SECOND TERM (*Required*).	
Algebra, (3)	68	Greek, (3)	30
Greek, (3)	29	Latin, (3)	21
Latin, (3)	20	German, (3)	46, 46a
German, (2)	45	Lit. Criticism and Essays, (2)	58, 60
Physics, (3)	168	American History, (2)	15
Physical Laboratory, (1)	170	(*Elective, four hours.*)	
English Lit. and Essays, (2)	57, 60	Greek, (2)	31
		Latin, (2)	22
		Projection Drawing, (4)	76
		Physics, (3)	169
		Physical Laboratory, (1)	171
		Surveying, (2)	77

JUNIOR YEAR.

FIRST TERM (*Required*).		SECOND TERM (*Required*).	
Psychology, (2)	1	Psychology, (2)	2
Economics, (1)	6	Economics, (1)	7
Oratory, (1)	61	German, (2)	50
German, (2)	49	French, (2)	38
French, (2)	37	European History, (2)	14
Chemistry, (2)	194	(*Elective, seven hours.*)	
Chemical Laboratory, (2)	195	Greek, (3)	33
(*Elective, five hours.*)		Latin, (3)	24
Greek, (3)	32	English Philology, (3)	63
Latin, (3)	23	American History, (2)	17
Anglo-Saxon, (3)	62	Calculus, (5)	71
American History, (2)	16	Mineralogy, (3)	129
Elementary Mechanics, (5)	70	Blowpipe Analysis, (1)	130
Electricity and Magnetism, (4)	172	Qualitative Analysis, (3)	196a
Electrical Laboratory, (1)	173		
Crystallography, (2)	128		

SENIOR YEAR.

FIRST TERM (*Required*).		SECOND TERM (*Required*).	
History of Philosophy, (2)	3	History of Modern Philosophy, (2)	4
Politics, (1)	11	Politics, (1)	12
(*Elective, thirteen hours.*)		Philosophy of Religion, (1)	5
Greek, (2)	34	Thesis.	
Latin, (2)	25	(*Elective, ten hours.*)	
German, (2)	51a *or* 52a	Greek, (2)	35 *or* 36
French, (2)	41	Latin, (2)	26
Middle English, (2)	64	German Literature, (2)	51b *or* 52b
Economic History, (2)	8	French, (2)	42
Politics, (1)	11a	Versification, (2)	65
Analytic Mechanics, (2)	72	Economics, (2)	10
Descriptive Astronomy, (3)	73	Politics, (1)	12a
Quantitative Analysis, (5)	199	Practical Astronomy, (2)	74
Blowpipe Analysis, (1)	131	Quantitative Analysis, (5)	202a
Lithology, (3)	142	Geology, (3)	146
Zoology, (3)	155	Biology, (3)	156

The figures in parentheses indicate the number of exercises per week.

THE LATIN-SCIENTIFIC COURSE.

FRESHMAN YEAR.

FIRST TERM.

Trigonometry and Algebra, (4) 67a, 68
Latin, (4) 18
German, (3) *or* } 47
French, (3) } 39
Rhetoric and Essays, (2) 53, 59
American Literature, (1) 54
Freehand Drawing, (2) 75
Hygiene, (1) 158

SECOND TERM.

Analytic Geometry, (5) 69
Latin, (5) 19
German, (3) *or* } 48
French, (3) } 40
English Lang., Essays, (3) 55, 56, 59

SOPHOMORE YEAR.

FIRST TERM.

Latin, (3) 20
German, (2) 49 *or* 45
French, (2) 37 *or* 41
Physics, (3) 168
Physical Laboratory, (1) 170
Chemistry, (2) 194
Chemical Laboratory, (2) 195
English Lit. and Essays, (2) 57, 60

SECOND TERM (*Required*).

Latin, (3) 21
German, (2) 50 *or* 46
French, (2) 38 *or* 42
Lit. Criticism and Essays, (2) 58, 60
American History, (2) 15

(*Elective, six hours.*)

Latin, (2) 22
Projection Drawing, (4) 76
Physics, (3) 169
Physical Laboratory, (1) 171
Surveying, (2) 77
Qualitative Analysis, (3) 196a

JUNIOR YEAR.

FIRST TERM (*Required*).

Psychology, (2) 1
Economics, (1) 6
Oratory, (1) 61
American History, (2) 16
French, (2) *or* } 41
German, (2) } 49

(*Elective, eight hours.*)

Latin, (3) 23
German, (2) *or* } 51a
French, (2) } 43a
Anglo Saxon, (3) 62
Elementary Mechanics, (5) 70
Electricity and Magnetism, (4) 172
Electrical Laboratory, (1) 173
Crystallography, (2) 128
Quantitative Analysis, (5) 199

SECOND TERM (*Required*).

Psychology, (2) 2
Economics, (1) 7
American History, (2) 17
French, (2) *or* } 42
German, (2) } 50
European History, (2) 14

(*Elective, seven hours.*)

Latin, (3) 24
German, (2) *or* } 51b
French, (2) } 43b
English Philology, (3) 63
Calculus, (5) 71
Mineralogy, (3) 129
Blowpipe Analysis, (1) 130
Quantitative Analysis, (5) 202a

SENIOR YEAR.

FIRST TERM (*Required*).

History of Philosophy, (2) 3
Politics, (1) 11

(*Elective, thirteen hours.*)

Latin, (2) 25
French, (2) 43a *or* 44a
German, (2) 51r *or* 52a
Middle English, (2) 64
Economic History, (2) 8
Politics, (1) 11a
Analytic Mechanics, (2) 72
Descriptive Astronomy, (3) 73
Blowpipe Analysis, (1) 131
Lithology, (3) 142
Zoology, (3) 155

SECOND TERM (*Required*).

History of Modern Philosophy, (2) 4
Politics, (1) 12
Philosophy of Religion, (1) 5
Thesis.

(*Elective, ten hours.*)

Latin, (2) 26
French, (2) 43b *or* 44b
German, (2) 51b *or* 52b
Versification. (2) 65
Economics, (2) 10
Politics, (1) 12a
Practical Astronomy, (2) 74
Geology, (3) 146
Biology, (3) 156

The figures in parentheses indicate the number of exercises per week.

THE COURSE IN CIVIL ENGINEERING.

The requirements for admission to this course may be found on pages 22-24. While French will be accepted instead of German, it is recommended that the latter be offered, as its technical literature is of greater value to the civil engineer.

The program of studies of this course, given on page 67, shows the subjects required to be completed by candidates for the degree of Civil Engineer. The numbers following the subjects refer to the detailed descriptions on pages 26-53. The figures in parentheses indicate the number of exercises per week.

The purpose of this course is to give a broad education in those general and scientific subjects which form the foundation of all branches of technology and special training in those subjects comprised under the term civil engineering. The graduate is not only prepared to enter upon the location and construction work of railroads, bridges, water works, or sewerage plants, but can advantageously take up allied work in mining, mechanical, electrical, or architectural engineering.

During the Freshman year the time is mostly devoted to fundamental studies which give both general culture and preparation for the technical work of the following years. The study of Mathematics, Physics, English, and German is continued. Chemistry is taught partly by lectures and partly by practical manipulation in the laboratory. Drawing is done throughout the year, freehand sketching in the first term and instrumental work in the second. There are lectures on Physiology and Hygiene, and systematic exercise in the gymnasium is required.

In the Sophomore year the fundamental subjects of Mathematics, Physics, and English are completed and the technical work of civil engineering is begun by practical problems in Structural Drawing and by lectures on Construction. During the Junior and Senior years the time is mostly devoted to professional studies, but there are lectures on Economics and on Philosophy, and the student has an opportunity of electing subjects which lead on the one hand in the direction of architecture and on the other hand in the direction of mining and metallurgy.

The work in Land Surveying is done in four weeks of the Summer vacation following the end of the Freshman year and that

in Topographic Surveying in four weeks following the end of the Sophomore year. By this arrangement the attention of the student is concentrated upon a single subject, thus enabling practical field operations to be exemplified in the best possible manner. In Railroad Surveying both preliminary and final locations of a line are made, and plans, profiles, and estimates of cost are prepared. In Geodetic Surveying triangulations of a high degree of precision are executed, as also determinations of azimuth, and adjustments of the results are made by the standard methods. A large collection of levels, transits, and other surveying tools enables the student to become familiar with the instruments of the best manufacturers.

Under the head of Construction are grouped the topics of masonry, foundations, roads and pavements, cements and mortars, walls, dams, arches, tunnels, and details of structures. The work covers three terms and is mainly by lectures, with references to standard books and engineering journals. Many visits of inspection to structures in the Lehigh Valley and vicinity are made, and written reports upon them are required. All the standard tests of cements and mortars are made by each student. In connection with the subject of Strength of Materials there is also work in the testing laboratory on timber, brick, iron, and steel.

Roofs and Bridges receive attention throughout five terms. The analysis of trusses by graphic methods is begun in the Sophomore year, and in the following year the analytical methods of computing stresses are taken up. Visits are made to bridges and sketches taken of details which are afterwards drawn to scale. Later, designs and working drawings are prepared by each student for both highway and railroad bridges. These drawings are made, dimensioned, and checked in the same manner as in the drafting room of a bridge company, and estimates of the final weight of the structure are prepared. The theory of cantilever, draw, suspension, and arched structures also receives detailed attention. This extended training in bridge engineering furnishes a thorough foundation for successful work in practice.

Hydraulic and Sanitary Engineering are treated at length. The theory of the flow of water through orifices, weirs, pipes and channels, together with the principles of hydraulic motors, is given in the Junior year, while in the Senior year the subjects

of water supply and sewerage are discussed. The methods of collecting, purifying and distributing water are explained and compared; house drainage, the design of sewerage systems, and the disposal of sewage also receive attention. Visits of inspection to water works are made and detailed reports upon them are prepared. Computations for dams, stand pipes, sewers and their appurtenances are made. Methods of measuring the flow of streams are practically exemplified on the Lehigh River. Irrigation by both water and sewage is also discussed. This training in Hydraulic and Sanitary subjects, together with that in Construction, renders the graduate well qualified to enter upon the work of city engineering.

Among other required subjects may be noted that of Strength of Materials, which gives the theory of beams, columns, and shafts, and the methods of computing and designing them; as already noted this subject is exemplified by practical work in the testing laboratory. The subject of Mechanics of Machinery treats of cranes, elevators, and locomotives, and that of Electric Railroads of the equipment and operation of trolley roads.

During the Junior and Senior years there are sixteen subjects offered, of which eight are to be elected by the student. Those intending to work in the line of architectural engineering will naturally select Perspective, Heating and Ventilation, and Architectural Design, while those wishing to work in the direction of mining and metallurgy will select Mineralogy, Lithology, Geology, and the Metallurgy of Iron. Other elective subjects are Steam Engine, Railroad Construction, and an advanced course in Materials of Construction with special reference to inspection and testing. In these subjects, as well as in all the work of this course, it is the aim to exemplify the theoretical principles by practical problems, inspections, designs or laboratory exercises. The testing laboratory of the University contains machines for making physical tests of tension, compression, flexure and torsion, and is of special value to students who select theses on investigations on the properties of materials.

The student who completes this course will receive the degree of Civil Engineer. Mature young men desiring to take special studies without being candidates for the degree will be afforded every facility in so doing.

THE COURSE IN CIVIL ENGINEERING.

FRESHMAN YEAR.

FIRST TERM.		SECOND TERM.	
Algebra and Trigonometry, (4)	68, 68a	Analytic Geometry, (5)	69
Chemistry, (2)	194	Physics, (3)	167
Chemical Laboratory, (2)	195	Projection Drawing, (4)	76
German, (3) *or* French, (3)	47 39	German, (3) *or* French, (3)	48 40
Freehand Drawing, (2)	75	English Lang. and Essays, (2)	55, 59
Hygiene, (1)	158		
Rhetoric and Essays, (2)	53, 59		
American Literature, (1)	54		

SUMMER TERM.

Land Surveying, 77

SOPHOMORE YEAR.

FIRST TERM.		SECOND TERM.	
Elementary Mechanics, (5)	70	Calculus, (5)	71
Physics, (3)	168	Physics, (3)	169
Physical Laboratory, (1)	170	Physical Laboratory, (1)	171
Construction, (3)	78	Construction, (3)	80
Structural Drawing, (3)	79	Graphic Statics, (3)	81
English Lit. and Essays, (2)	57, 60	Lit. Criticism and Essays, (2)	58, 60

SUMMER TERM.

Topographic Surveying, 82

JUNIOR YEAR.

FIRST TERM.		SECOND TERM.	
Descriptive Astronomy, (3)	73	Railroad Surveying, (4)	87
Strength of Materials, (4)	83	Hydraulics, (4)	88
Construction, (3)	84	Bridge Design, (3)	89
Roofs and Bridges, (4)	85	Economics, (1)	7
Economics, (1)	6	Architecture, (3) *or* Mineralogy, (3)	90 129
Perspective, (2) *or* Crystallography, (2)	86 128	Railroads, (2) *or* Practical Astronomy, (2)	91 74

SENIOR YEAR.

FIRST TERM.		SECOND TERM.	
Geodetic Surveying, (3)	93	Bridges, (3)	100
Bridge Design, (3)	94	Electric Railways, (2)	190
Sanitary Engineering, (5)	95	Philosophy of Religion, (1)	5
Mechanics of Machinery, (2)	109	Geology, (3) *or* Steam Engine, (3)	146 107a
Lithology, (2) *or* Architectural Design, (2)	142 96	Metallurgy, (5) *or* Architectural Design, (5)	136 101
Materials, (2) *or* Heating and Ventilation, (2)	97 98	Thesis,	102

The figures in parentheses indicate the number of exercises per week.

THE COURSE IN MECHANICAL ENGINEERING.

The object of this course is the study of the Science of Machines. The principal subjects taught are: the nature, equivalence, and analysis of mechanisms, the mechanics or theory of the principal classes or types of machinery, mechanical technology, the principles and practice of machine design, and the measurement of power. The program of studies on page 71 shows the subjects required to be completed for the degree of Mechanical Engineer.

The earliest shop visits are for the purpose of acquainting beginners with machine parts and the usual tools of a shop. These visits are a part of the work of a Summer Session, lasting four weeks, which is held at the close of the second term of Freshman year. Thus at the very beginning of the course the student is brought into direct contact with the elements of machinery and the common resources of the shop, becomes familiar with technical terms, and is in a position to understand and appreciate subsequent instruction.

In this same Summer Session the students of Mechanical Engineering are also given a course in the examination of electrical instruments and machinery and in the inspection of their use and operation in electrical plants. This is regarded as a very desirable preliminary to the study of Physics and to the special course in Electrical Engineering which they pursue later on.

A second Summer Session at the end of the Sophomore year provides a course of shop instruction (Mechanical Technology), which does not necessarily involve manual labor and manipulation of tools, but is principally devoted to familiarizing the student with those points in pattern making, moulding, forging, fitting and finishing, which they need to know as designers of machinery. Particular attention is, therefore, directed to the forms and sizes of machine parts that can be readily constructed in the various shops; to the time that it takes to perform, and the order of, the various operations; to the dimensions most needed by workmen, and to the various devices for increasing the accuracy of the work, durability of the parts, and convenience of manipulation.

During the course there are frequent visits of inspection to the Bethlehem Steel Company, to the L. V. R. R. shops at Easton,

and to other engineering works both in and out of town, with special reference to such subjects as prime movers, machinery for lifting, handling, and transporting, and machinery for changing the form and size of materials. It is intended that each of these excursions shall have some definite purpose in view which must be fully reported by the students. These visits are also made the occasion for continued practice in the freehand sketching of machinery.

The instruction in Machine Design begins with the second term of the Freshman year and is continued throughout the course. At first tracings and blue prints of good examples of drawings of machinery are made. A thorough drill in projection drawing follows; in this work freehand sketches are first made, and measurements taken, of machine pieces; these sketches are then converted into full sized drawings. Then there is considerable practice in the interpretation of such drawings, and general view of lathes, planers, drills, and shapers are made from the drawings of the details. This is followed by difficult projections and intersections and exercises in the empirical proportioning of machine parts. Both empirical and rational formulas are used to determine the dimensions of fastenings, bearings, rotating and sliding pieces, belt and toothed gearing, levers and connecting rods, the data being given as they would arise in practice and the drawings made full size. During the Junior year the class takes up the design of a high-speed steam engine, every dimension being determined by the students and complete drawings made. During the Senior year the students undertake the calculations, estimates, and working drawings involved in the design of a simple but complete machine, each student being engaged upon a different machine. In the case of these machines and of the engine the general plan of arrangement will be given to the students in the form of rough sketches, photographs, or woodcuts. In the last term the students are expected to make original designs for simple machinery, whose object has been fully explained.

The students in Mechanical Engineering are given a special course in Electrical Engineering after they have finished the regular and general course in Physics. The object is to impart a clear conception of electrical units and a working knowledge

of resistance, impedance, inductance, reactance, capacity, and the magnetism of iron, and the magnetic circuit as used in the construction of electrical machinery. Attention is then directed to the theory and calculation of direct current dynamos, to the study of variable and alternating current phenomena, and to the theory of the alternating current transformer. Practical problems are given in these subjects to show their application. The laboratory work which accompanies this special course involves tests of resistance, insulation, consumption of energy, and efficiency. Instruction is also given in locating and remedying the common faults of dynamos and motors.

The course in Measurement of Power involves much practice with the indicator. Cards are taken from the many types of engines running in the shops and power houses of the vicinity, and thorough drill is given in working up and interpreting these cards. There are also experiments with dynamometers of the friction brake, belt, float, and cradle varieties. The work in boiler testing usually includes a test of the boilers of the University, a combined engine and boiler test at one of the silk mills, and a test of the boilers and pumping engine of the Water Works.

In the Senior year Marine Engineering is offered as an optional course to the students of this department. This course concerns itself mainly with the Engine or Power Department of Shipbuilding, and is treated as an advanced portion or Steam Engineering and Applied Mechanics. The available time is, therefore, principally devoted to Marine Boilers and their accessories, to Marine Engines, both main and auxiliary, and to the Theory of the Screw Propeller. The time remaining is given to the Hull Department of Shipbuilding by the study of the Mechanics of Flotation and Stability, and to the Resistance and Steering of Ships.

After consultation with the head of the department a part, not exceeding one-fourth, of the work peculiar to this course may be replaced by an equivalent amount of work in Electricity.

All the students in this course are required to study both German and French.

The graduates in this course will receive the degree of Mechanical Engineer (M.E.).

THE COURSE IN MECHANICAL ENGINEERING.

FRESHMAN YEAR.

FIRST TERM.		SECOND TERM.	
Algebra and Trigonometry (4)	68, 68a	Analytic Geometry, (5)	69
Chemistry, (2)	194	Physics, (3)	167
Chemical Laboratory, (2)	195	Draw'g and Mach. Design, (3)	103
German, (3) *or* French, (3)	47 / 39	German, (3) *or* French, (3)	48 / 40
Freehand Drawing, (2)	75	English Lang., Essays, (3)	55, 56, 59
Hygiene, (1)	158		
Rhetoric and Essays, (2)	53, 59		
American Literature, (1)	54		

SUMMER TERM.

Machinery and Electrical Apparatus, 104

SOPHOMORE YEAR.

FIRST TERM.		SECOND TERM.	
Elementary Mechanics, (5)	70	Calculus, (5)	71
Physics, (3)	168	Physics, (3)	169
Physical Laboratory, (1)	170	Physical Laboratory, (1)	171
Machine Design, (3)	105	Steam Engine, (4)	107
Boilers, (1)	106	French, (2) *or* German, (2)	38 / 46
French, (2) *or* German, (2)	37 / 45	Lit. Criticism and Essays, (2)	58, 60
English Lit. and Essays, (2)	57, 60		

SUMMER TERM.

Mechanical Technology, 108

JUNIOR YEAR.

FIRST TERM.		SECOND TERM.	
Analytic Mechanics, (2)	72	Metallurgy, (5)	136
Mechanics of Machinery, (2)	109	Graphic Dynamics, (3)	110
Electricity and Magnetism, (4)	172	Mechanics of Machinery, (3)	111
Electrical Laboratory, (1)	173	Alternating Currents, (2)	180
Strength of Materials, (4)	83	Dynamo Laboratory, (1)	189
Economics, (1)	6	Economics, (1)	7
French, (2) *or* German, (2)	39 / 47	French, (2) *or* German, (2)	40 / 48
Oratory, (1)	61		

A Special Option in Electrical Engineering may be arranged.

SENIOR YEAR.

FIRST TERM.		SECOND TERM.	
Thermodynamics (3)	112	Machine Design, (5)	120
Kinematics of Machinery, (5)	113	Hydraulics, (3)	99
Machine Design, (4)	114	Measurement of Power, (1)	122
Measurement of Power (1)	115	Philosophy of Religion, (1)	5
OPTIONS.		Thesis.	127
Graphic Statics, (2) / Mechanics of Machinery, (2)	92 / 116	OPTIONS.	
or		Mechanics of Machinery, (4)	123
Marine Engineering, (1)	117	*or*	
Marine Engineering, (2)	118	Marine Engineering, (2)	124
Marine Engineering, (1)	119	Marine Engineering, (2)	125
		Marine Engineering, (2)	126

A Special Option in Electrical Engineering may be arranged.

The figures in parentheses indicate the number of exercises per week.

THE COURSE IN METALLURGICAL ENGINEERING.

This course is designed to prepare the student for practice in the field of Metallurgy. In addition to the general studies underlying all technical education, instruction is given in Free-hand and Projection Drawing, Analytical Mechanics, The Strength of Materials, including work in the testing laboratory, Graphical Statics, as applied to roof trusses and girders, Mechanical Technology, Steam Boilers, The Steam Engine, The Mechanics of Machinery, involving the study of hoisting and pumping engines, air compresors, blowing engines, fans, etc., The Measurement of Power, Hydraulics, including hydraulic motors, and Electro-technology, including the theory of electric motors and dynamos and laboratory work in electrical measurements. The student is thus made acquainted with the principles involved in the design and construction of the buildings and machinery constituting a metallurgical plant, and in the operation of the machines.

A thorough course is given in Physics, including laboratory work in mechanics and calorimetry.

In Chemistry, in addition to the training in chemical theory involved in the courses in Stoichiometry and Chemical Philosophy, much time is devoted to work in the laboratory, involving the qualitative and quantitative analysis, both gravimetric and volumetric, of the more common ores and metallurgical products, including gas analysis and dry assaying. The student is thus made thoroughly familiar with the principles of the two chief sciences on which the operations of metallurgy are based and with the methods of analysis employed in the laboratories of smelting works.

Courses in Mineralogy and Blowpipe Analysis involve practice in the identification of crystals and of minerals by their physical properties and their behavior before the blowpipe. The mineralogical laboratory affords facilities for advanced courses in geometric and physical crystallography which are not included in the ordinary curriculum. The equipment of this laboratory has been increased during the past year by the purchase of a theodolite goniometer and a lamp of Professor Goldschmidt's design, the funds for which were generously donated by seven

alumni of the University. An elective course in Quantitative Blowpipe Analysis is open to a limited number of students.

A course in Lithology gives practice in the identification of rocks and is followed by courses in Historic, Dynamic and Economic Geology.

A course in Ore Dressing renders the student familiar with the principles and methods of the mechanical preparation of ores and fuels.

The special instruction in Metallurgy is begun by a course in Metallurgical Construction. The class is taken on visits of inspection to neighboring metallurgical works. Each student makes sketches and takes notes of an assigned portion of the plant. From these working drawings are made and memoirs written describing and discussing the plant inspected. The student is thus rendered familiar with the furnaces and apparatus employed in metallurgical establishments, and with the methods in use in their drafting rooms. Courses of lectures in Metallurgy extend throughout a year. In these the chief weight is laid upon the chemical and physical principles involved in the various metallurgical processes. In order to impress these principles upon the mind of the student and to render their application familiar he is required to solve a series of problems which embody them. The problems are chiefly such as confront the metallurgist in his practice. In the course of Metallurgical Design the class is required to design a metallurgical plant to be operated under given conditions, a certain portion being assigned to each student. This involves calculations of stresses, weights and costs, the execution of working drawings and the discussion of the methods and apparatus chosen.

The metallurgical laboratory affords opportunity for special investigations in subjects connected with Metallurgy to such advanced students as are competent to conduct them.

The vicinity of the works of the Bethlehem Steel Company and of the New Jersey Zinc Company and the kindness of their officers give opportunities for frequent visits of inspection by the students in classes and individually, and thus afford unusual facilities for the practical study of the metallurgy of iron and of zinc. Occasional visits of inspection are made to more distant works.

THE COURSE IN METALLURGICAL ENGINEERING.

FRESHMAN YEAR.

FIRST TERM.		SECOND TERM.	
Algebra and Trigonometry, (4)	68, 68a	Analytic Geometry, (5)	69
Chemistry, (2)	194	Physics, (3)	167
Chemical Laboratory, (2)	195	Qualitative Analysis, (3)	196
German, (3) *or*	47	Stoichiometry, (2)	197
French, (3)	39	German, (3) *or*	48
Freehand Drawing, (2)	75	French, (3)	40
Hygiene, (1)	158	English Lang., Essays, (2)	55, 59
Rhetoric and Essays, (2)	53, 59		
American Literature, (1)	54		

SUMMER TERM.

Machinery and Electrical Apparatus, 104

SOPHOMORE YEAR.

FIRST TERM.		SECOND TERM.	
Elementary Mechanics, (5)	70	Calculus, (5)	71
Physics, (3)	168	Physics, (3)	169
Physical Laboratory, (1)	170	Physical Laboratory, (1)	170
Drawing, (4)	133	Blowpipe Analysis, (1)	130
Crystallography, (2)	128	Mineralogy, (3)	129
English Literature, Essays, (2)	57, 60	Metallurgical Construction, (3)	184
		Lit. Criticism, Essays, (2)	58, 60

SUMMER TERM.

Mechanical Technology, 108

JUNIOR YEAR.

FIRST TERM.		SECOND TERM.	
Strength of Materials, (4)	83	Metallurgy, (5)	136
Boilers, (1)	106	Steam Engine, (4)	107
Lithology, (3)	142	Geology, (3)	146
Blowpipe Analysis, (1)	131	Quantitative Analysis, (4)	202
Chemical Philosophy, (3)	198	Economics, (1)	7
Quantitative Analysis, (3)	199		
Economics, (1)	6		
Oratory, (1)	61		

SENIOR YEAR.

FIRST TERM.		SECOND TERM.	
Metallurgy, (4)	137	Mechanics of Machinery, (4)	123
Assaying, (3)	212	Metallurgical Design, (2)	135
Quantitative Analysis, (3)	206	Mining Engineering, (3)	163
Electrotechnology, (2)	191	Hydraulics, (3)	99
Graphic Statics, (2)	92	Measurement of Power, (1)	122
Economic Geology, (2)	148	Philosophy of Religion, (1)	5
Measurement of Power, (1)	115	Thesis.	139

The figures in parentheses indicate the number of exercises per week.

THE COURSE IN MINING ENGINEERING.

The course as taught in this University unites the branches of Mining and Metallurgy up to the end of the fifth term, when the student shall have an opportunity to survey the ground and learn in which direction his tastes or his chances direct him before making his choice between the mine and the furnace.

In both courses have been included sufficient practice in the wet, dry and blowpipe assay to enable the graduate to ascertain readily the constituent elements of any ore, while the metallurgical option adds the ability to analyze volumetrically the furnace products. Neither course aims to turn out a metallurgical chemist, and the chemistry is designed rather for the engineer than the analyst. Both options include thorough training in drawing, construction and design of mining and metallurgical plant, with working details, and cost of erection. The data for these problems are obtained by frequent and regular visits to mines and furnaces in the vicinity.

The mining option (A) gives a more thorough training in geology by including geodetic and geological surveying and the microscopic analysis of rocks. It also grades towards Civil Engineering by including topographic and railroad surveying, so that the graduate is not only prepared to develop a property, but to open it to traffic.

The metallurgical option (B) not only includes with the mining option a detailed study of the mechanics of the machinery included in mining and metallurgical plant, but adds thereto a study of the steam engine and practice in measurement of its power, with a full survey of the ground of electric motors and experiments in detecting causes of failure or loss of power.

The facilities for the study of mining and economic geology are unequalled, as within easy reach are quarries of limestone, slate and cement; mines of zinc, paint ore, brown hematite, magnetite, block and fossil hematites, and the great anthracite fields of the State. The metallurgical facilities are equally good, as well as the chances for extensive illustration of mechanical engineering, as in the same borough lie the great rail, armor, and gun works of the Bethlehem Steel Company and the spelter and oxide works of the Lehigh Zinc & Iron Company.

THE COURSE IN MINING ENGINEERING.

FRESHMAN YEAR.

FIRST TERM		SECOND TERM.	
Algebra and Trigonometry, (4)	68, 68a	Analytic Geometry, (5)	69
Chemistry, (2)	194	Physics, (3)	167
Chemical Laboratory, (2)	195	Qualitative Analysis, (3)	196a
German, (3) *or* French, (3)	47 / 39	Stoichiometry, (2)	197
Freehand Drawing, (2)	75	German, (3) *or* French, (3)	48 / 40
Projection Drawing, (2)	133	English Lang. Essays, (3)	55, 56, 59
Hygiene, (1)	158		
Rhetoric and Essays, (2)	53, 59		
American Literature, (1)	54		

SUMMER TERM.

Land Surveying, 77

SOPHOMORE YEAR.

FIRST TERM.		SECOND TERM.	
Elementary Mechanics, (5)	72	Calculus, (5)	71
Physics, (4)	168	Physics, (3)	169
Physical Laboratory, (1)	170	Mineralogy, (3)	129
Crystallography, (2)	128	Blowpipe Analysis, (1)	130
Zoology, (3)	156	Geology, (4)	147
Drawing, (2)	133	Lit. Criticism, Essays, (2)	58, 60
English Lit. and Essays, (2)	57, 60		

SUMMER TERM.

Topographic Surveying, 82

JUNIOR YEAR.

FIRST TERM.		SECOND TERM.	
Mining Engineering, (3)	159	Mining Engineering, (2)	161
Mining, (2)	160	Metallurgy, (5)	136
Assaying, (3)	212	Metallurgical Construction, (3)	134
Strength of Materials, (4)	83	Quantitative Analysis, (3)	202
Chemical Philosophy, (3)	198	Economics, (1)	7
Quanttiative Analysis, (2)	199	Geological Surveying, (2)	151
Blowpipe Analysis, (1)	131	Miniug Engineering, (3) *or* Steam Engine, (4)	163 / 167
Economics, (1)	6		

SENIOR YEAR.

FIRST TERM.		SECOND TERM.	
Mining Engineering, (1)	162	Metallurgical Design, (2)	135
Mine Surveying, (2)	164	Mechanics of Machinery, (4)	123
Metallurgy, (4)	137	Hydraulics, (3)	99
Mining Design, (2)	155	Philosophy of Religion, (1)	5
Mechanics of Machinery, (2)	116	Thesis,	166
OPTIONS.		OPTIONS.	
Geodetic Surveying, (3)	93	Railroad Surveying, (4)	87
Petrology, (2)	144, 145	Petrology, (2)	145
or		*or*	
Measurement of Power, (1)	115	Measurement of Power, (1)	122
Quantitative Analysis, (2)	206	Mining Engineering, (3)	163
Electricity and Magnetism, (4)	172	Dynamo Laboratory, (1)	189
Electrical Laboratory, (1)	173		

The figures in parentheses indicate the number of exercises per week.

THE ELECTRICAL ENGINEERING COURSE.

The special technical studies in this course include Mechanical Engineering and Electro-technology.

The special technical studies in Mechanical Engineering are as follows: (*a*) The Shop and Station Visits of the first Summer Term, which are devoted to the study of tools, of machine and dynamo parts, and of electrical appliances such as lightning arresters, rheostats, lamps, gas lighting apparatus, etc. (*b*) The second Summer Term is devoted to the Mechanical Technology of Machine Construction. (*c*) The study of Boilers and Engines. (*d*) Elementary and Advanced Machine Design. These studies are described under the numbers 103, 104, 105, 106, 107, 108, 109, 112, 114, 115, and 121.

The special studies in Electro-technology are: electric signalling, telegraphy and telephony; the theory and design of electrical machinery; the design of electric generating and distributing plants for light and power; electrical testing; and electro-metallurgy. These studies in electro-technology, excepting Summer Term work, begin with the second term of the Junior year and constitute about three-fifths of the work of the student during the remaining three terms of the course. Textbook and lecture work is supplemented by visits of inspection and by reports from individual members of the class upon subjects which have been assigned to them. These reports are based upon inspections of commercial installations and upon work done in the library.

After consultation with the head of the Electrical Engineering department a part, not exceeding one-fourth, of the special work in electro-technology may be replaced by an equivalent amount of work in Mechanical Engineering.

The student who completes all the studies of this course will receive the degree of Electrical Engineer (E.E.).

Opportunities for graduate study are offered by the Department of Physics and Electrical Engineering in the following subjects: Advanced Theory of Alternating Currents, Experimental Researches in Electrical Engineering, Theoretical Physics, and Physical Research.

THE COURSE IN ELECTRICAL ENGINEERING.

FRESHMAN YEAR.

FIRST TERM.		SECOND TERM.	
Algebra and Trigonometry, (4)	68, 68a	Analytic Geometry, (5)	69
Chemistry, (2)	194	Physics, (3)	167
Chemical Laboratory, (2)	195	Drawing and Mach. Design. (3)	103
German, (3) *or*	47	German, (3) *or*	48
French, (3)	39	French, (3)	40
Freehand Drawing, (2)	75	English Lang., Essays,	55, 56, 59
Hygiene, (1)	158		
Rhetoric and Essays, (2)	53, 59		
American Literature, (1)	54		

SUMMER TERM.

Machinery and Electrical Apparatus, 104

SOPHOMORE YEAR.

FIRST TERM.		SECOND TERM.	
Elementary Mechanics, (5)	70	Calculus, (5)	71
Physics, (3)	168	Physics, (3)	169
Physical Laboratory, (1)	170	Physical Laboratory, (1)	171
Machine Design, (3)	105	Steam Engine, (4)	107
Boilers, (1)	106	French, (2) *or*	38
French, (2) *or*	37	German, (2)	46
German, (2)	43	Lit. Criticisms, Essays, (2)	58, 60
English Lit. and Essays, (2)	57, 60		

SUMMER TERM.

Mechanical Technology, 108

JUNIOR YEAR.

FIRST TERM.		SECOND TERM.	
Analytic Mechanics, (2)	72	Dynamos and Motors, (3)	176
Mechanics of Machinery, (2)	109	Alternating Current Mach., (2)	182
Electricity and Magnetism, (4)	172	Dynamo and Motor Design, (1)	177
Electrical Laboratory, (1)	173	Alternating Currents, (2)	180
Strength of Materials, (4)	83	Telegraphs and Telephones, (3)	175
Economics, (1)	6	Electrical Laboratory, (1)	174
French, (2) *or*	39	Qualitative Analysis, (3)	196a
German, (2)	45	Economics, (1)	7
Oratory, (1)	61	French, (2) *or*	40
		German, (2)	48

SENIOR YEAR.

FIRST TERM.		SECOND TERM.	
Dynamos and Motors, (2)	178	Alternating Current Mach., (2)	182
Dynamo and Motor Design, (2)	179	Design of Alternating Current Machinery, (2)	183
Alternating Currents, (2)	181	Electric Systems, (2)	185
Electric Lighting and Power Stations, (2)	184	Dynamo Laboratory, (3)	187
Dynamo Laboratory, (3)	186	Machine Design, (2)	121
Machine Design, (2)	114a	Electrometallurgy, (1)	138
Thermodynamics, (3)	112	Hydraulics, (3)	99
Measurement of Power, (1)	115	Philosophy of Religion, (1)	5
		Thesis,	193

The figures in parentheses indicate the number of exercises per week.

THE COURSE IN CHEMISTRY.

This course of study is designed to prepare students for the profession of the chemist, in connection with metallurgical establishments, sugar refineries, gas works, superphosphate works, electrical machinery manufactories, mining companies, etc., and the general consulting and analytical work of the professional chemist. It is also well adapted to the preparation of teachers of chemistry and as a course preliminary to the study of medicine.

Instruction in Theoretical Chemistry begins in the first term of the Freshman year, with two lectures and six hours' laboratory work on general inorganic chemistry. Stoichiometry, with practice in chemical problems, is begun in the second term of the Freshman year and continued through the Sophomore year during which Chemical Philosophy also is studied. In the first term of the Junior year there is a course of lectures and recitations, four times each week, on theoretical organic chemistry.

Qualitative Analysis is taught by lectures and laboratory work, fifteen hours each week, in the second term of the Freshman year. This is followed by courses in Quantitative Analysis throughout the Sophomore and first term of the Junior year—eighteen hours each week in the second term Sophomore year and fifteen hours in the two other terms. This course includes Gas Analysis. Furnace Assaying and the assay of gold and silver bullion are taught in the first term of the Senior year by lectures and nine hours' laboratory work each week. The analysis of various commercial products is taken up in the second term of the Senior year, also the subjects of Sanitary and Physiological Chemistry and Toxicology. Blowpipe analysis also is included in the course.

The practical work in Organic Chemistry is performed in the second term of the Junior year, with eighteen hours of laboratory work and conference. There are also courses of practical microscopy and photography, and lectures upon industrial chemistry and toxicology. In the Senior year the student prepares a thesis on some chemical subject, involving laboratory work.

The laboratory for qualitative analysis is a large, well ventilated, and well lighted room, supplied with convenient working tables, vacuum filtration, hoods for noxious vapors, steam baths,

gas and washing appliances, and a commodious room for hydrosulphuric acid. Distilled water is delivered by faucet in this room and the other large laboratories.

The quantitative laboratory is equipped like the qualitative laboratory, but is supplied in addition with apparatus for drying precipitates and residues, rooms for the chemical balances, for combustions, and for a reference library.

The gas laboratory is supplied with full and complete apparatus for gas analysis, according to Bunsen's processes, as well as apparatus for some of the more rapid methods.

The assaying laboratory is supplied with large working tables, twenty-nine crucible and two iron furnaces, and eight muffle furnaces, with adjoining rooms for balances, and gold and silver bullion analysis.

The laboratory for organic chemistry is equipped similarly to the quantitative laboratory, in addition being supplied with steam, cold water and air blast upon the working tables, and a full supply of apparatus for the various determinations and experiments, including combustion furnaces, furnaces for heating sealed tubes, mercury pump, Hoffman's, Dumas's and Meyer's apparatus for vapor densities, nitrometers, chemical balances, etc.

The working laboratories for industrial chemistry contain an apparatus for making illuminating gas, an alcohol still, worm and doubler, and a complete working model of a sugar refinery, including filters, vacuum pan, and centrifugal. There is also apparatus for use in the manufacture of chemicals, for dyeing, calico printing, and bleaching. In connection with these laboratories is a room containing a photometer and apparatus for determining the sulphur, ammonia, and specific gravity of illuminating gas; also a laboratory for the testing of alcoholic liquors, sugar, molasses, bone black, soap, petroleum, paints, dyes, superphosphates, tallow, illuminating and lubricating oils, rubber, explosives, asphalts, and other commercial products, with the necessary technical apparatus. The students make practical experiments in this direction, and, with an instructor, visit various industrial establishments in this neighborhood and in and around New York City. Fifteen hours of laboratory work are required each week throughout the Senior year. A well equipped photographic laboratory and dark rooms are provided, in which the students of the chemical course receive practical instruction.

THE COURSE IN CHEMISTRY.

FRESHMAN YEAR.

FIRST TERM.		SECOND TERM.	
Algebra aud Trigonometry,(4)	68,68a	Qualitative Analysis, (5)	196
Chemistry, (2)	194	Stoichiometry, (2)	197
Chemical Laboratory, (2)	195	Physics, (3)	167
German, (3) *or*	47	German, (3) *or*	48
French, (3)	39	French, (3)	40
Freehand Drawing, (2)	75	English Lang. and Essays,(2)	55, 59
Hygiene, (1)	158		
Rhetoric and Essays, (2)	53, 59		
American Literature, (1)	54		

SOPHOMORE YEAR.

FIRST TERM.		SECOND TERM.	
Chemical Philosophy, (2)	198	Physics, (3)	169
Quantitative Analysis, (5)	199	Physical Laboratory, (1)	171
Quant. Anal. Conference, (1)	200	Quantitative Analysis, (6)	202
Physics, (3)	168	Quant. Anal. Conference, (1)	203
Physical Laboratory, (1)	169	Theoretical Chemistry, (3)	204
English Lit. and Essays, (2)	57, 60	Lit. Criticism and Essays, (2)	58, 50

JUNIOR YEAR.

FIRST TERM.		SECOND TERM.	
Toxicology, (2)	205	Organic Chemistry, (6)	209
Quantitative Analysis, (5)	206	Org. Chem. Conference, (1)	210
Quant. Anal. Conference, (1)	206a	Metallurgy, (5)	136
Organic Chemistry, (4)	208	Mineralogy, (3)	129
Crystallography, (2)	128	Blowpipe Analysis, (1)	130
Economics, (1)	6	Economics, (1)	7
Oratory, (1)	61		

SENIOR YEAR.

FIRST TERM.		SECOND TERM.	
Metallurgy, (4)	137	Industrial Chemistry, (3)	214
Assaying, (3)	212	Industrial Analysis, (3)	215
Industrial Chemistry, (3)	211	Ind. Chem. Conference, (1)	216
Geology, (3)	148	Agricultural Chemistry, (1)	217
Microscopy, (2)	213	Sanitary Chemistry, (1)	218
Blowpipe Analysis, (1)	131	Geology, (3)	146
		Philosophy of Religion, (1)	5
		Thesis,	219

The figures in parentheses indicate the number of exercises per week.

THE COURSE IN GEOLOGY.

This course is designed to meet the requirements of the teacher, the geological surveyor, and the prospector who desires to go into the field and acquire proficiency by practice, or to extend their knowledge of the subjects treated by graduate work in this University. It includes all of the mathematics, physics, and analytical mechanics taught in the technical courses, thus ensuring an ability to grasp and solve the problems of geological dynamics. A reading knowledge of French and German is acquired during the course, so that the student feels at home with foreign periodical literature in these languages.

The surveying courses afford practice in accurate mapping and the location of stations by latitude and longitude, as well as the noting of the geological features, so that the geologist or prospector will be able to record his work according to the most approved methods.

The course in crystallography, mineralogy, geology, petrology, and physiography will permit him with slight effort not only to recognize any of the constituents of the earth's crust, but to value the portion surveyed from an economic standpoint as it is adapted, or not, for mining operations.

The ordinary course in Geology is extended by excursions into the foundations of Botany, Zoölogy, and Biology, and supplemented by work in the field in the courses in Surveying and Physiography. The ability readily to determine the character and value of the ores and minerals met with is guaranteed by extended courses in Crystallography, Mineralogy, Megascopic and Microscopic Rock Analysis, Economic Geology, and both Chemical and Blowpipe Analysis. The course in Chemistry includes assaying, quantitative wet analysis and the discussion of chemical problems, so that mineralogical formulae can be calculated from the results of analyses. The blowpipe courses cover qualitative and quantitative work. Economic Geology is taught in a thorough manner and applied by courses in refractory materials and general metallurgy which contain problems depending upon the composition and impurities of ores and gangues; by a course in ore dressing which treats of the separation of ores and impurities, and by a course in prospecting which treats of the presentation of ores and gangues at the surface and the rules for their discovery.

THE COURSE IN GEOLOGY.

FRESHMAN YEAR.

FIRST TERM.		SECOND TERM.	
Algebra and Trigonometry, (4)	68, 68a	Analytic Geometry, (5)	69
Chemistry, (4)	194	Physics, (3)	167
Chemical Laboratory, (2)	195	German, (3) *or*	48
German, (3) *or*	47	French, (3)	38
French, (3)	39	Qualitative Analysis, (3)	196
Freehand Drawing, (1)	75	Blowpipe Analysis, (1)	130
Hygiene, (1)	158	English Lang., Essays, (3)	55, 56, 59
Rhetoric and Essays, (2)	53, 59		
American Literature, (1)	54		

SUMMER TERM.

Land Surveying, 77

SOPHOMORE YEAR.

FIRST TERM.		SECOND TERM.	
Elementary Mechanics, (5)	70	Calculus, (5)	71
Physics, (3)	168	Physics, (3)	169
Physical Laboratory, (1)	170	Mineralogy, (3)	129
Crystallography, (2)	128	Stoichiometry, (2)	197
Chemical Philosophy, (3)	198	French, (2) *or*	38
French, (2) *or*	37	German, (2)	42
German, (2)	41	Lit. Criticism and Essays, (2)	58, 60
English Lit. and Essays, (2)	57, 60		

SUMMER TERM.

Topographic Surveying, 82

JUNIOR YEAR.

FIRST TERM.		SECOND TERM.	
Botany, (1)	154	Geology, (4)	147
Zoology, (3)	155	Biology, (3)	157
Petrology, (2)	144, 145	Petrology, (2)	145
Blowpipe Analysis, (1)	131	Quantitative Analysis, (5)	202
Assaying, (3)	212	Economics, (1)	7
Quantitative Analysis, (3)	199	French, (2) *or*	40
Economics, (1)	6	German, (2)	48
French, (2) *or*	39		
German, (2)	47		
Oratory, (1)	61		

SENIOR YEAR.

FIRST TERM.		SECOND TERM.	
Mining Engineering, (3)	159	Geological Surveying, (2)	151
Economic Geology, (2)	148	Metallurgy, (5)	136
Physiography, (3)	149	Mining Engineering, (3)	163
Mine Surveying, (2)	164	French, (2)	42
Descriptive Astronomy, (3)	73	Philosophy of Religion, (1)	5
French, (2)	41	Thesis,	158
Geodetic Surveying, (3)	93		

The figures in parentheses indicate the number of exercises per week.

PHYSICAL CULTURE.

All students on entering the University are required to undergo a physical examination and special exercises are prescribed for each student. During the Freshman year gymnasium exercise is required twice a week, and there is a general dumb-bell drill for students of all classes four times a week, at which attendance is optional. All exercises are under the direction and supervision of a skilled and competent instructor and are designed to promote the harmonious and symmetrical development of the individual student.

GRADUATING THESES.

Every student is required to present a thesis upon some topic connected with the course from which he is to graduate, as a necessary portion of the exercises for his final examination for a diploma. These theses are accompanied by drawings and diagrams, whenever the subjects need such illustration. The originals will be kept by the University, as a part of the student's record, for future reference; but a copy may be retained by the student, and be published, permission being first obtained from the President.

DIPLOMAS AND CERTIFICATES.

The Diploma is given only to those who have passed all the examinations in a regular course and is signed by the Secretary of the Board of Trustees and by the Faculty of the University. For all the partial courses a certificate is given, signed by the Secretary of the Faculty, and showing what the student has accomplished.

THE UNIVERSITY LIBRARY.

The Library building was erected by the Founder of the University in 1877, at a cost of $100,000, as a memorial of his daughter, Mrs. Lucy Packer Linderman, and during the same year more than $20,000 was contributed by her family and friends as a memorial fund for the purchase of books. By the will of the Founder of the University a fund of $500,000 was bequeathed for the permanent endowment of the library.

The building is semi-circular in plan, with a handsome façade in the Venetian style of architecture. It is constructed of Potsdam sandstone with granite ornamentation. In the interior the center is occupied as a reading space, fifty by forty feet, from which radiate the book cases, extending from floor to ceiling; two galleries affording access to the upper cases. Shelf room is now provided for one hundred and sixty thousand volmes. The building is thoroughly fireproof, well lighted, and heated by steam.

One hundred and twelve thousand volumes are now upon the shelves, including many extremely valuable books. The list of periodicals numbers about two hundred and fifty, embracing as far as possible all departments of knowledge.

The Library is conducted strictly for consultation, and is open to the use of the public; both of which conditions are in accord with the terms of the gift.

THE ECKLEY B. COXE MEMORIAL LIBRARY.

In memory of the Honorable Eckley B. Coxe, who was for many years a Trustee of the University and who was profoundly interested in its welfare, Mrs. Coxe has presented to the University his technical library, consisting of 7727 volumes, together with 3429 pamphlets. As the working library of a man who was remarkable as well for the breadth of his culture as for the extent and thoroughness of his acquaintance with the whole field of applied science, this addition to the resources of the University possesses the greatest value for all professional students.

OBSERVATORY.

By the liberality of Robert H. Sayre, Esq., one of the Trustees of the University, an astronomical observatory was erected on the University grounds, and placed under the charge of the Professor of Mathematics and Astronomy.

In the dome of the observatory is mounted an equatorial telescope, of six inches aperture, by Alvin Clark & Sons. The west wing contains a sidereal clock, by Wm. Bond & Sons; a zenith telescope, by Blunt, and a field transit, by Stackpole. There is also a prismatic sextant, by Pistor & Martins.

Students in practical astronomy receive instruction in the use of the instruments and in actual observation.

The land upon which the Observatory stands, consisting of seven acres adjoining the original grant, was presented to the University by Charles Brodhead, Esq., of Bethlehem.

THE UNIVERSITY MUSEUM.

In addition to the large collection illustrating all branches of Industrial Chemistry, the Museum includes collections in Metallurgy, Geology, Zoölogy, and Archæology.

The Metallurgical Cabinet includes specimens illustrating the various processes for obtaining the more common metals.

The Zoölogical Cabinet includes the Werner collection of nearly all the types of American birds with their nests and eggs, and the Packer collection of recent shells.

The Geological Cabinet numbers over ten thousand specimens and includes the Palæontological, Mineralogical, Petrographic, and Economic collections. The first contains good specimens of nearly all the common genera. The Mineralogical division includes the Keim and Roepper collections—the latter being especially complete and valuable from a crystallographic standpoint. The Petrographic division numbers several thousand specimens and, besides including numerous varieties of nearly all the rocks of the globe, contains a duplicate set from the collection of the Second Geological Survey of this State. The Economic division was formed and given by Dr. James P. Kimball, ex-Director of the Mint, and formerly Professor of Economic Geology.

The Cummings Archæological Cabinet numbers three thousand specimens and includes Dr. Stubbs's collection of Indian relics, weapons, and utensils.

UNIVERSITY LECTURES.

From time to time during the University year, distinguished members of the various professions are invited to lecture before the student body upon those special subjects to which they have given particular attention and upon which they are authorities.

The following lectures were given in this course during the year 1897-'98 and 1898-'99:

Mr. H. F. J. Porter, "Modern Methods of Making Steel Forgings."

Col. H. G. Prout, "Railroad Accidents."
Mr. John Birkinbine, "Engineering on the Great Lakes."
Mr. W. B. Snow, "Mechanical Draught."
Mr. H. W. Raymond, "Warships Old and New."
Mr. Alfred Raymond, "Chartres Cathedral."
Dr. C. B. Dudley, "The Work of a Chemist on a Railroad."
Mr. J. C. Trautwine, jr., "The Water Works of Philadelphia."
Mr. George S. Morison, "Masonry."
Mr. F. L. Grammer, "Blast Furnace Management."
Mr. Hampton L. Carson, "A Lawyer's View of the Question "Why am I Obliged to Tell the Truth?"
Mr. R. W. Hunt, "Iron Making in Sweden."
Mr. Joseph Wharton, "Tariffs and Tariff Making."
Capt. E. L. Zalinski, "Fortifications."
Mr. F. H. Newell, "Hydrography of the United States."
Mr. John Sterling Deans, "Experiences and Lessons from the Life of a Bridge Engineer."

THE CHEMICAL AND NATURAL HISTORY SOCIETY OF THE LEHIGH UNIVERSITY.

This Society was organized in the Fall of 1871, as "The Chemical Society," but was afterwards expanded, as its present title indicates, and admits, by election, students from all departments of the University.

The collections of botanical and zoölogical specimens belonging to the Society are important. During the past years persons have been sent to Texas and Brazil to collect specimens for these cabinets.

The Society has organized and maintained several courses of public scientific lectures.

THE ENGINEERING SOCIETY.

This Society was organized in 1873, and admits, by election, students in the Senior, Junior and Sophomore Classes. At its meetings papers relating to engineering subjects are read and discussed. From 1885 to 1890 it issued quarterly five volumes of "The Journal of the Engineering Society," containing contributions by the members, alumni, and others. Many of the papers

read before this society from 1890 to 1893 were published in "The Lehigh Quarterly."

The Society includes in its membership students from all the engineering courses of the University. In addition to the general organization of the Society the representatives of the Civil and Mechanical Engineering Courses form subordinate sections, with separate organizations and stated fortnightly meetings, for the discussion of subjects of particular interest.

THE ELECTRICAL ENGINEERING SOCIETY

was organized in 1887. Its object is to supplement the regular work in Electrical Engineering by the discussion of current topics in electricity and by lectures given under the auspices of the society by engineers and by members of the corps of instructors in the department of Electrical Engineering.

THE AGORA AND THE FORUM

are literary and debating societies which meet semi-monthly. The Agora is the older society and was formerly restricted in its membership to students in the School of General Literature, but in 1893 it was thrown open to all students; and shortly afterward the Forum was organized. These societies have proved of great advantage to their members in the development of concise and logical thinking, in the promotion of ease before an audience, and in the acquirement of experience in parliamentary methods. Through these societies the University is represented in the Pennsylvania Inter-collegiate Oratorical Union. An annual contest in debate is held with representatives of the literary societies of several other colleges. The societies have justified their existence by the great increase in the amount of attention given, not only to training in oratory and debate, but also to those subjects of the day which are constantly discussed at their meetings.

THE MATHEMATICAL CLUB.

This club was organized in February, 1895. Its members are students in the Junior and Senior classes. Its object is to continue the study of higher mathematics after having completed the mathematical course of the University. It holds frequent meetings, at which papers are read and discussed by its members.

THE ECONOMIC SOCIETY

meets on the second and fourth Tuesday of each month of the college year. Under the direction of the Professor of Economcis the Society serves as a training place for the students of the upper classes for the discussion and application of economic principles to current questions.

THE LEHIGH UNIVERSITY CHRISTIAN ASSOCIATION.

This is a voluntary organization of the students for the promotion of the religious, moral, and social life of the University. It was organized April 18, 1890, and on Oct. 11, 1890, united itself with the Intercollegiate Young Men's Christian Association. The movement is distinctly for and by students, all the officers being chosen from the student body.

FOUNDER'S DAY.

On the second Thursday of October of each year, Commemorative Exercises are held in honor of the Founder of the University. On Thursday, October 12, 1899, the twentieth Founder's Day was celebrated. An address was delivered by Robert Ellis Thompson, S.T.D., President of the Boys' Central High School, of Philadelphia, Pa. His subject was "The University and the Commonwealth."

UNIVERSITY SERMON.

This sermon is preached on the Sunday before University Day.

The Rev. Elwood Worcester, Ph.D., D.D., Rector of Saint Stephen's Church, Philadelphia, was the preacher on Sunday, June 11, 1899, in the Packer Memorial Church.

THESES.

Theses on the following subjects were prepared by candidates for degrees in 1899:

FOR THE DEGREE OF MASTER OF ARTS.

NATT M. EMERY, B.A., Bethlehem.
The Philosophy of Carlyle.

ROBERT EDWARD LARAMY, B.A., Bethlehem.
The Pre-Shakespearian Drama.

FOR THE DEGREE OF MASTER OF SCIENCE.

JOHN HENRY KLINCK, M.E., Charleston, S.C.
A Photometric Study of Commercial Forms of Lamp Globes and Shades.

PERCY LAWRENCE REED, C.E., New Bedford, Mass.
The Elasticity and Strength of Flat Metallic Plates under Transverse Stresses.

FOR THE DEGREE OF ENGINEER OF MINES.

HENRY THEODORE BORHEK, B.S., Bethlehem.
An Attempt to Determine the Pre-glacial Course of the Manokisy.

JOSÉ MARIA GARZA GALAN, JR., B.S., Saltillo, Mex.
The New Coal-field of Coahuila, Mexico, and a Discussion of its Coal.

RAFAEL FRANCISCO SANCHEZ, B.S., Gibara, Cuba.
The Concentration of Pumping Plant in the Diamond Mine.

FOR THE DEGREE OF BACHELOR OF SCIENCE.

JOHN MORGAN BUCKLAND, Hokendauqua.
Legislation on Silver in the United States.

FOR THE DEGREE OF CIVIL ENGINEER.

GEORGE FRED ALLEN, Florida, N.Y.
Comparative Plans and Estimates for Steel Stand Pipes and Tower Tanks.

JOSÉ FERNANDO CAPRILES, Puerto Cabello, Venezuela.
Plan and Estimate for a Separate Sewage System for the City of Valencio, Venezuela.

CHARLES FORD CARMAN, Cedarville, N.J.
The Construction, Strength, and Resistance to Heat of Floors for Fireproof Buildings.

JOHN PETER CROLL, Trexlertown.
Comparison of the Strength and Physical Properties of several varieties of Paving Brick.

ROBERT FARNHAM, JR., Washington, D.C.
The Influence of Sewage on the Strength and Durability of Hydraulic Mortars and Concretes, with especial reference to their use in Sewer Construction.

JOSÉ GERVASIO GANDIA, San Juan, Puerto Rico.
Applications of Analytic Geometry to Surveying and Triangulation.

OSCAR COOPER HANNUM, Philadelphia.
The Strength and Weathering Qualities of Hydraulic Mortars and Concretes, with especial reference to their use in House Building.

GEORGE REIFSNYDER JACKSON, Scranton.
Investigation of the Stability of Six Masonry Dams near Scranton, Pa.

EDWARD ALLEN KEYS, Linden, Md.
The Stiffness and Strength of Combined Concrete and Steel Beams.

RICHARD SKERRETT LANDRON, San Juan, Puerto Rico.
Tests of the Stiffness and Strength of eight species of Timber used in Engineering Construction in Puerto Rico.

CHARLES G. NEWTON, Guadalajara, Mexico.
The Sanitary Condition of the City of Guadalajara, with a Plan and Estimate for a Sewerage System.

PERCY LESLEY REED, Altoona.
Comparison of Interlocking Systems for Railroad Switches and Signals, with reference to the Design of a Pneumatic Plant for the Lehigh Valley Railroad at South Bethlehem, Pa.

VICTOR HUGO REID, Brooklyn, N.Y.
Description, Discussion, and Comparison of the Railroad Frogs within three miles of Lehigh University.

ROBERT MAXIMILIAN STRAUB, Pittsburg.
The Manufacture of Brick near Bethlehem, Pa., with Tests of Porosity and Strength of different Qualities and Grades.

HARRY ANDERSON WILCOX, West Granby, Conn.
Plan for the Disposal of the Sewage of South Bethlehem, Pa., by the Method of Intermittent Filtration and Broad Irrigation.

FOR THE DEGREE OF MECHANICAL ENGINEER.

MAURICE CLARK BENEDICT, (with A. Shimer), Altoona.
Test of a Group of Boilers near Drifton, Pa.

FRANK ELLIOTT BRADENBAUGH, Parkersburg, W.Va.
Design of a Ten Ton Cupola and its Hoisting Gear.

BERNARD TODD CONVERSE, Louisville, Ky.
The Automatic Justification of Type.

RUDOLPH DEGENER, New York. N.Y.
Plans and Estimates for the Construction of a Mill Producing 500,000 Yards of Silk Plush.

RUSSELL KIMBALL, New York, N.Y.
American Locomotive Link and Valve Motions.

ARTHUR WARNER KLEIN, Bethlehem.
The Principles and Problems of Mechanical Flight.

FREDERICK JOHN LITTELL, (with C. M. Masson), Erie.
Test of Engines and Boilers at the Lehigh Valley Cold Storage Plant.

CHARLES MICHAEL MASSON, (with F. J. Littell), Rheims,N.Y.
Test of Engines and Boilers at the Lehigh Valley Cold Storage Plant.

JAMES FLANDERS MIDDLEDITH, Plainfield, N.J.
Discussion and Test of a Station Gas Meter.

HENRY RALPH PALMER, West Chester.
The Efficiency and Practical Value of American Wind Engines.

GUSTAVO ROVELO, Comitan-Chiapas, Mex.
The Location and Construction of Artesian Wells for Irrigation.

ABRAHAM SHIMER, (with M. C. Benedict), West Bethlehem.
Test of a Group of Boilers near Drifton, Pa.

GEORGE HERBERT WOOD, Chambersburg.
Design for a Rope Transmission for the Carpenter Steel Works of Reading, Pa.

FOR THE DEGREE OF BACHELOR OF SCIENCE.

(IN METALLURGY.)

ROY RHODES HORNOR, Clarksburg, W.Va.
A Discussion of Uehling's Casting Machine.

ALEXANDER T. JOHNSON, (with W. Worthington), Towanda.
Design of a Plant for the Desilverization of Lead by the Parker Process.

JOHN READ PETTIT, Philadelphia.
The Recovery of the Smaller Sizes of Anthracite Coal from Culm Banks.

WARREN WORTHINGTON, M.E., (with A. T. Johnson), Rushland.
Design of a Plant for the Desilverization of Lead by the Parker Process.

FOR THE DEGREE OF ELECTRICAL ENGINEER.

LEON WHETSTONE BAILEY, (with A. K. Birch), Delano.
Investigation of Glass Jacketed Incandescent Lamp Filaments.

ARTHUR KNODE BIRCH, (with L. W. Bailey), Washington, D.C.
Investigation of Glass Jacketed Incandescent Lamp Filaments.

EUGENE GIFFORD GRACE, (with J. W. Grace, jr.), Goshen, N.J.
Efficiency Tests of Gravity Cells.

JOHN WESLEY GRACE, JR., (with E. G. Grace), Goshen, N.J.
Efficiency Tests of Gravity Cells.

OWEN GRAY MACKNIGHT, Philadelphia.
Critical Study of the Operating Conditions of the Allentown-Bethlehem Electric Railway.

J. FOSTER MORGAN, (with A. P. Steckel), Harwood Mines.
Investigation of Martienssen's Method for Measuring Inductance.

JOHN THOMAS MORROW, Great Falls, Mont.
On the Influence of Arsenic upon the Electrical Conductivity of Copper.

LOUIS THOMAS RAINEY, Decatur, Ill.
Design and Construction of a Magnetic Plunger.

ABRAM PETERS STECKEL, (with J. F. Morgan), Lykens.
Investigation of Martienssen's Method for Measuring Inductance.

JOHN SAGE VIEHE, Atlanta, Ga.
A New Method for Multiplex Telegraphy.

FOR THE DEGREE OF ANALYTICAL CHEMIST.

RICHARD CHARLES BECERRA, JR., Caracas, Venezuela.
Coffee and its Adulterations.

WILLIAM GUMMERE, South Bethlehem.
Commercial Sugars, their Properties and Production, with Experiments on the Cultivation of Sugar Beets in the Saucon Valley, Northampton County, Pa.

GEORGE AUGUSTUS HORNE, Plainfield, N.J.
Portland Cement.

GEORGE KENNEDY MCGUNNEGLE, Meadville.
On the Preparation of Isometric Amyl Acetates, used as Flavoring Extracts.

WILLIAM LATHROP MEAKER, Bethlehem.
On Meta-amido-benzene-sulphonic Acid and its Derivatives.

WILLIAM FREDERICK ULRICH, Bethlehem.
On the Disposition of Tannic Acid in Tanning.

FREDERICK CHARLES WETTLAUFER, New York, N.Y.
On the Acetin Derivatives of Glycerine.

FOR THE DEGREE OF BACHELOR OF SCIENCE.

(IN ARCHITECTURE.)

JOSÉ FERNANDO CAPRILES, Puerto Cabello, Venezuela.
Plans and Specifications for a Steel-framed College Building to be erected in Puerto Cabello, Venezuela.

WILLIAM HAROLD SPEIRS, St. Louis, Mo.
Plans and specifications for a Railroad Station for the Lehigh Valley and Philadelphia & Reading Railroads at South Bethlehem, Pa.

UNIVERSITY DAY.

This day is the last of the academic year, and falls in 1900 on the third Wednesday in June. On this day orations are delivered by members of the graduating class, and degrees are conferred.

EXERCISES ON JUNE 14, 1899.

MUSIC.

READING OF SCRIPTURE AND PRAYER.

MUSIC.

Salutatory Oration.—"Personality."

JOHN SAGE VIEHE.

MUSIC.

Oration.—"Four Hundred Years of Spanish Domination."

LEON WHETSTONE BAILEY.

Oration.—"The Lower and the Higher Selfishness."

ABRAM PETERS STECKEL.

MUSIC.

Alumni Address.—"Our Industrial Progress."

RUFUS KING POLK, B.S., E.M.,
Class of 1887.

MUSIC.

Valedictory Oration.—"The Future of Electricity."

EUGENE GIFFORD GRACE.

MUSIC.

Address to the Graduating Class,
BY THE RIGHT REVEREND ETHELBERT TALBOT, D.D., LL.D.

Award of the Wilbur Scholarship to
EDWIN BENTON WILKINSON, of Williamsport,
first in rank in the Sophomore Class.

The Price Prize for English Composition, open to members of the Sophomore Class, was awarded to

EDWIN BENTON WILKINSON, of Williamsport,
with honorable mention of
PAUL LEWIS ANDERSON, of Somerville, N. J., and
LEWIS ALFRED FREUDENBERGER, of West Bethlehem.

The Wilbur Prizes, for excellence in the studies of Freshman year, were awarded as follows:

In Mathematics to
WILLIAM FRANK ROBERTS, of Freeland,
ALBERT CASS HUTCHINSON, of Mishawaka, Ind., and
FREDERICK FARRAR LINES, of South Bethlehem.
In German, to
FELIX GOLIAN, of Phoenixville.
In French, to
ROBERT WILLIAM THOROUGHGOOD, of Georgetown, Del.
In English, to
ROBERT MONTGOMERY BIRD, of South Bethlehem.
In Freehand Drawing, to
WILLIAM L. FLEMING, of New Castle, and
JAMES NETHERMARK DOWNEY, of Lancaster.
In General Chemistry, to
WILLIAM BERGER GEISER, of Bath.

Degrees were then conferred by the President of the University upon the candidates whose names appear in the Thesis List, as given above.

THE WILBUR SCHOLARSHIP.

This Scholarship was founded in 1872 by E. P. Wilbur, Esq., of South Bethlehem, and is the sum of $200 awarded annually to the student in the Sophomore Class having the best record.

THE ALUMNI SCHOLARSHIP FUND.

The Alumni Association of the University has established a Scholarship Fund, for the assistance of worthy students. Such assistance is to be given in the form of loans, secured by notes properly endorsed, subject to the following conditions:

1. That loans from this fund shall be made only to students in need of such help.

2. That help in this form shall not be given during the first year of any student's course; he must without this aid have gone through one year, and must be prepared to start the second year free from all conditions.

3. That help in this form shall not be continued to a student who shall at any time during his course carry any condition over eight weeks beyond the date of the examination in which he failed.

Subject only to the above conditions the disposal of the fund shall until otherwise directed be in the hands of the President of the University.

THE HENRY S. HAINES MEMORIAL SCHOLARSHIP.

Mrs. Henry S. Haines, of Savannah, Ga., established in 1889 a scholarship of the annual value of $200, which is to be devoted to the support at the Lehigh University, throughout his scholastic career, of one student in the School of Mechanical Engineering.

THE FRED. MERCUR MEMORIAL FUND SCHOLARSHIPS.

Friends of the late Frederick Mercur, desiring to establish a memorial of their friendship and esteem, and to perpetuate his memory, have contributed and placed in the hands of the Trustees a fund, to be called "The Fred. Mercur Memorial Fund," sufficient in amount to insure the award of six scholarships for free tuition in the University.

THE ECKLEY B. COXE MEMORIAL FUND.

In memory of the late Eckley B. Coxe, Trustee of the University, Mrs. Coxe has established a fund, amounting to $24,000, the interest of which is to be used, under the direction of the Trustees of the University, and subject to such regulations as they may adopt, for the assistance of students who without such aid would not be able to meet the cost of living as students of the University.

WILBUR PRIZES.

By the generosity of E. P. Wilbur, Esq., a fund has been established, yielding an actual income of $100, for distribution in prizes as the Faculty shall determine.

THE PRICE PRIZE FOR ENGLISH COMPOSITION.

Dr. Henry R. Price, an Alumnus and Trustee of the University, established in 1898 an annual prize of the value of $25, to be awarded in June to that member of the Sophomore Class who shall write the best essay on a topic in English Literature assigned by the head of the department of English not later than the beginning of the Second Term in each year.

In estimating the value of all such essays the greatest stress will be laid upon clearness of thought and idiomatic force of expression; and, in the judgment of the examiner, while looking for correctness of thought put into clear and forcible English, expression will take precedence of ideas. For this specific end, weight will be given to the form rather than to the matter presented.

Competitors must signify their intent not later than the first of April.

The subject for the prize essay in June, 1900, will be: "Robert Browning as a Lyric Poet."

ALUMNI PRIZES FOR ORATORY.

The "Alumni Association of the Lehigh University" established in 1882 an annual sum of Fifty Dollars, to be distributed in prizes for excellence in Oratory, subject to the following

REGULATIONS.

1. The Contest shall be held on the 22d day of February, or on the day designated by the University to commemorate the birthday of Washington.

2. There shall be a first prize of $25, a second of $15, and a third of $10.

3. To entitle one to be a competitor he must be a member of the Junior Class, taking a regular course.

4. Subjects for the orations shall be announced at the beginning of the first term of every year, and upon one of these each competitor shall write an oration not to exceed 1200 words, taking about eight minutes in delivery.

5. Each oration shall bear upon its first page a fictitious name or motto, and shall be accompanied by a sealed envelope, which shall be superscribed with the same name or motto, and an address by which it may be reclaimed. The envelope shall contain the real name and address of the writer, with the declaration that the oration is his own original work. The examiner, having adopted a standard of excellence, may reject any or all of the orations presented which do not attain to this standard; of such as do—should they be sufficient in number—the best six shall be chosen, and their envelopes opened. The others shall be returned to the address given with their envelopes unopened.

6. The Executive Committee of the Alumni Association, or a committee of not fewer than three to be appointed by them, shall hear the competitors whose orations shall have been approved, and the awards shall be made by a majority of these judges.

7. In awarding the prizes the judges shall consider both the literary merits and the delivery of each oration.

8. These rules are subject to amendment by the Faculty.

The annual contest in Oratory for the Alumni Prizes was held on Feb. 22, 1899, with the following competitors:

George William Barager, of Hazleton.
John George Heinz, of Louisville, Ky.
James George Ross, of Kittanning.

The First Prize was awarded to George William Barager; the Second to John George Heinz; the Third to James George Ross.

PRIZES IN ENGLISH AND ORATORY.

A friend of the University, who desires for the present to remain unknown, established in February, 1900, prizes amounting annually to three hundred and thirty-five dollars for excellence in English Composition and Oratory. The conditions of the endowment are as follows:

First. At the beginning of each term the Sophomore Class shall be divided into two sections alphabetically, and to that student in each section who, at the end of a term, and of each term, shall receive the highest rank in English Composition during that term shall be awarded the "First Sophomore Composition

Prize," of ten dollars, and to that student in each section as aforesaid who shall receive the next highest rank in the same subject shall be awarded the "Second Sophomore Composition Prize," of five dollars. In each year there will be offered four first and four second prizes—a total of sixty dollars.

If more than one student shall receive the highest rank in any section, the amounts of the two prizes shall be added together and the sum—Fifteen Dollars—shall be equally divided between them, and no second prize shall be offered to that section. If more than one student shall receive the next highest rank in any section where there is but one contestant for the first prize, the second prize shall be equally divided between the two having the second rank.

Second. The Faculty shall publish within one month from the beginning of the University year a list of subjects for dissertations, selected from English Literature and Economics, entitled, Subjects for Senior Premiums. To this list shall be appended a date near the first of January following—to be determined upon by the Faculty—when the contest shall be declared closed and the dissertations shall become due.

From the above list any member of the Senior Class may select a subject and write thereon a dissertation, whose length shall be prescribed by the Faculty, and shall send the same anonymously, but marked for identification, as the Faculty may direct, to the Secretary of the Faculty before the date aforesaid.

The Faculty, or their committee, shall meet on the above date and at subsequent adjourned meetings and, first, having determined upon a standard of excellence which each and all dissertations must reach in order to be admitted to the following competition, shall examine the dissertations submitted to them and admit those which reach the above standard. In case none are up to the standard, and are admitted, they shall declare the contest closed for that year, and no prizes shall be awarded; but the sum of one hundred and fifty dollars, which is in the hands of the President to pay for them, shall be used by him in such manner as he shall see fit to encourage public speaking in the University.

If one or more dissertations are admitted as aforesaid, the Faculty, or their committee, shall arrange them in the order of their literary merit and soundness of their reasoning, and the six

highest in this arrangement shall be retained and all others returned as directed by the writers, who shall remain unknown. The names of the successful writers shall be ascertained and they shall be required to recast their dissertations in the form of an oration, and to speak the same in public at such time during the Commencement Week as the Faculty shall determine.

The Faculty, or their committee, shall be the judges of excellence in the speaking, and shall award to that Senior student who shall speak his oration in the best manner, the Senior Gold Medal, of the value of one hundred dollars, or, at his option, one hundred dollars in gold. They shall award to the other five speakers the five Senior Premiums of ten dollars each.

If fewer than six candidates shall present dissertations, or fewer than six dissertations shall be admitted to the contest, the whole, or such part of the sum of the above one hundred and fifty dollars as shall not be awarded at the close of the contest, and shall remain in the hands of the President, shall be used by him, as aforesaid, to further public speaking in the University, in any manner as he may see fit.

Third. At the end of the University year, during Commencement Week, the Faculty shall publish a second list of subjects for theses selected from English Literature, Economics, Mental and Moral Science, and similar subjects which require thought and application, and which must be of such a character that their mastery shall be accomplished only through considerable research and study.

From this list any member of the class just graduating; the Senior Class of the coming University year; a graduate of one year's standing whether in or out of residence, and a graduate of any class who may be, during the coming year, in actual residence and taking postgraduate work in the University, may select a subject and write thereon a thesis of not less than five thousand words and send the same to the Secretary of the Faculty, anonymously, but marked for identification as the Faculty may designate, before the date, which the Faculty shall select within one month before the next Commencement, and which date must appear on the above list.

The Faculty, or its committee, shall meet on this date, and at adjourned meetings thereafter, and, having first established a

standard of excellence, which must, first, be a high one, and, second, shall require on the part of the competitor ability in the plan, development, argument, and conclusion of the work, as well as literary merit in its composition and presentation, shall admit to the following competition only those which fully attain to the above required standard.

If none of the theses submitted shall have attained to the standard aforesaid, the competition shall be declared closed and the prize shall not be awarded. The sum of one hundred and twenty-five dollars in the hands of the President to pay this prize, in the event of its not being awarded, as aforesaid, shall be used by him to further public speaking, as aforesaid, unless, however, he may consider that he has already a sufficient fund in his hands for that purpose. In this latter case, he shall use this above sum of one hundred and twenty-five dollars to encourage public debate in the University in any manner that he may see fit.

To the author of that thesis which shall have been admitted to the competition, and which shall have been declared of the highest excellence, the Graduate Prize of one hundred and twenty-five dollars shall be awarded and presented on Commencement Day with the other prizes and awards of that day.

The successful thesis shall be the property of the University; but the author shall be allowed to retain one copy. Publication of the thesis by the author will only be permitted by vote of the Faculty. Such publication must, however, be entitled Graduate Prize Thesis of the Lehigh University.

The winner of a prize shall not be allowed to compete again.

ENTRANCE EXAMINATION PAPERS.

Used for Examination in 1899.

I.—ENGLISH.

1. Define Rhetoric. Is it a science or an art? Compare it, in this respect, with grammar and logic.

2. What is the province of Style; its most essential element? Define Style. What is individuality in style?

3. Define Diction. What cautions are to be observed about "present use" of words? About Latin or Saxon words? About provincial, technical, and archaic words?

4. What are figures of speech? When is their use appropriate? What figures promote clearness and concreteness? What is an abstract idea?

5. State the essentials of a good definition? Define any three common nouns on that plan. Define a *rule* and a *concrete example.*

6. State the rhetorical value of a Simile and a Metaphor. How do they differ? Upon what relation is Metonymy based? What are the natural defects of Allegory?

7. Meanings of Allegory, Personification, Antithesis; upon what principle is the last based? What are a climax and an anti-climax? Is the latter ever allowable?

8. What is meant by Suspension? What is a balanced sentence; a loose sentence; a periodic sentence? What are synonyms, and on what principle are they to be distinguished and used? What are homonyms?

9 and 10. Write a short piece of narrative prose of not more than 200 words on one of the following subjects: 1. The Story of Macbeth. 2. Robert Burns.

II.—UNITED STATES HISTORY AND CONSTITUTION.

1. Draw a map of North America, showing the possessions of England, France, and Spain in 1750.

2. What were the causes of the French and Indian War?

3. What were the causes which led to the revolt of the English Colonies?

4. What were the troubles which led to the adoption of the present Federal Constitution?

5. Draw map showing the boundaries of the United States in 1800.

6. What political parties controlled the Federal Government before 1860?

7. (*a*) What was the origin of the present Republican party? (*b*) What was the difference between the Republican party of 1800 and the Republican party of 1860?

8. (*a*) How is the Federal Constitution amended? (*b*) What are the principal points in the "war" amendments?

9. How does the Constitution provide for the choosing of the President and Vice President?

10. Can a State levy duties on imports and exports?

III.—GEOMETRY.

1. (*a*) Define Theorem, Segment of a circle, Segments of a line, circular sector, "ratio of similitude." (*b*) What is a locus? Give an example.

2. Prove that the three perpendiculars from the vertices of a triangle to opposite sides meet in same point.

3. Having given (*a*) two angles of a triangle to find the third. (*b*) two sides of a triangle and an angle opposite one of them to construct the triangle.

4. (*a*) Through a point without a circle to draw a tangent to the circle. (*b*) To draw a common tangent to two given circles of unequal radii.

5. Prove that two triangles having an angle of the one equal to an angle of the other, are to each other as the product of the sides including these angles.

6. Prove that if the circumference of a circle be divided into any number of equal parts, the chords joining successive points of division form a regular polygon.

7. (*a*) When are two polyedrons similar? (*b*) How many regular polyedrons are possible, and why? (*c*) What is the vol-

ume and lateral area of a square pyramid whose base is 16 sq. ft., altitude 4 meters.

8. (*a*) What is a spherical angle and how is it measured? (b) What is the area of the spherical triangle whose angles are 100°, 120°, 150°, on a sphere whose radius is 10 ft.?

9. Prove that the volume of any parallelopiped is equal to the product of its base by its altitude.

10. Prove that two symmetrical spherical triangles are equivalent.

IV.—ALGEBRA.

1. *a*. Define Algebra, coefficient, exponent, surd, radical.

b. When is $x^n \pm y^n$ divisible by $x \pm y$? Give proof.

2. Expand $(a^2-b^2)^7$ and $(a+2b)^9$ to four terms, by binomial formula.

3. Solve $\sqrt{x-7} = \sqrt{x+1} - 2$; also $\dfrac{\sqrt{x}+a}{\sqrt{x}-b} = \dfrac{\sqrt{x}-a}{\sqrt{x}}$.

4. Simplify (*a*). $\dfrac{x^2+xy}{x^2+y^2} \times \dfrac{x^4-y^4}{xy+y^2} \times \dfrac{y}{x}$. (*b*). $\dfrac{1}{a^2-\dfrac{a^3-1}{a+\dfrac{1}{a+1}}}$

5. Factor $x^3 - \dfrac{4}{x}$; find H. C. F. and L. C. M. of $x^3+2ax^2+a^2x+2a^3$ and $x^3-2ax^2+a^2x-2a^3$.

6. Rationalize the denominator of $\dfrac{3+\sqrt{2}}{\sqrt{2}+5}$; simplify $\left(\dfrac{27\,x^3}{8a^{-3}}\right)^{-\frac{2}{3}}$; also $(8^{\frac{2}{3}}+4^{\frac{3}{2}})\,(16)^{-\frac{3}{4}}$.

7. Two digits, which form a number, change places when 18 is added to the number, and the sum of the two numbers thus formed is 44; find the digits.

8. Solve $y = \dfrac{x+a}{2} + \dfrac{b}{3}$; $x = \dfrac{y+b}{2} + \dfrac{a}{3}$.

9. How much are pears a gross when 12 more for a dollar lowers the price 5 cents a dozen?

10. Solve $x^3 - y^3 = 28$, $x^2+xy+y^2 = 7$.

V.—PHYSICS.

1. A moving ship is acted on by two forces, namely, the thrust of the propeller and the drag of wind and water. When the ship is gaining speed which of these forces is the greater? When the ship is losing speed which is the greater? When the ship neither gains nor loses speed what is the relative value of the forces? Justify your answer in each case by statements of Newton's First and Second Laws of Motion.

2. A cubic foot of water weighs about 62 lbs.; calculate the submerged volume of a ship weighing 15,000 tons (2000 lbs=1 ton).

A cubic meter of air weighs about 1200 grams. A cubic meter of hydrogen weighs about 90 grams. A balloon contains 400 cubic meters of hydrogen and the material of the balloon weighs 250 kilograms. What is the net lifting capacity of the balloon?

3. A steam engine cylinder is 8 inches in diameter. The steam pressure is 80 lbs. per square inch. What is the force pushing on the piston?

The stroke of the engine is 14 inches. How much work is done by the steam during one stroke?

4. A man lifts a weight of 500 lbs. through a vertical distance of 12 feet per minute by means of a windlass. What part of a horse power does the man develop?

5. What is the name of the process by means of which heat is transmitted from the sun to the earth? Give other examples of the same process. By what means (mainly) is heat distributed throughout a vessel of water on a stove? What is the name of this process? Give other examples of it. What is the name of the process by which heat is carried along a metal rod? Name several substances in the order of the facility with which they transmit heat by this last process.

6. The temperatures of boiling water on a high mountain, at sea level and in a boiler which furnishes steam to a steam engine are different. Which is the hottest and which is the coolest? What is it that causes the boiling point of water to be different in these different cases?

7. Describe three fundamental phenomena of the electric current and describe practical applications of electricity exemplifying each.

8. An iron rod is wound with insulated wire. What is the effect on the rod when an electric current is sent through the wire? What is such an arrangement called? Name several practical appliances of each of which the above is an essential part.

9. An ordinary electric bell continues to ring so long as the push button is depressed. Make a diagram showing the electrical connections of such a bell, including push button and battery, and explain the vibratory action of the bell.

10. What is the physical difference between a noise and a musical tone? Musical notes may differ in loudness, in pitch and in timbre or quality; explain the physical basis of each.

VI.—GERMAN.

1. Decline: „mein altes Haus," „kleine Stadt," and „ihr guter Vater," in Singular and Plural.

2. Give the genitive singular, and nominative plural of the following nouns with the article:

Tag, Band, Herz, Blume, Bank, Knabe, Sohn, Thor.

3. Give a synopsis (third person singular) active and passive voice of „ausgeben."

4. Name the auxiliaries of Tense, tell how they are used and give examples.

5. Give the auxiliaries of Mode and tell how they are used in the perfect tenses with and without another verb and give sentences containing examples.

6. Give the third person singular, present and past tense (Ind. and Subj.) of the following verbs:

meiden, raten, entlaufen, anfangen, biegen, schlafen.

7. Name the different classes of conjunctions and tell how their use affects the order of the words in the sentence, give examples.

Translate into German:

1. At what time will the train leave for New York?

2. He was seen by the soldiers on Monday, March Eighteenth, Eighteen-hundred and ninety-nine.

3. The king has accepted the work which the celebrated writer had offered him.

4. The physician entertained the man with many old stories.

5. What would she have said if she had seen him.

6. The small boy we saw upon the street last week died yesterday.

7. I was compelled to remain at home because my sister was ill.

8. Three pairs of shoes.—I am cold.—I succeeded.—I like to go walking.—A year ago.

Translate into English:

In einem kleinen Hause, welches wol eine Viertelstunde abseits von dem übrigen Dorfe auf der halben Berghöhe lag, wohnte mit seinem alten Vater ein junger Bauer Namens Jörg. Es gehörte zu heim Hause so viel Acker Feld, dasz beide eben keine Sorgen hatten. Gleich hinter dem Hause fing der Wald an, mit Eichen [1] und Buchen, [2] so alt, dasz die Enkelkinder von denen, welche sie gepflanzt hatten, schon seit mehr als hundert Jahren tot waren; vor ihm aber lag ein alter zerbrochener Mühlstein—wer weisz, wie der dahin gekommen war. Wer sich auf ihn setzte, der hatte eine wundervolle Aussicht hinab ins Thal, auf den Flusz, der das Thal durchströmte, und die Berge, die jenseits des Flusses aufstiegen. Hier sasz der Jörg am Abend, wenn er seine Arbeit auf dem Felde gethan hatte, den Kopf auf die Hände und die Ellenbogen auf die Kniee gestützt, oft stundenlang und träumte, und weil er sich wenig um die Leute im Dorf bekümmerte und meist still und in sich gekehrt [3] einherging, wie Einer, der an allerhand denkt, nannten ihn die Leute spottweise Traumjörge. Dies war ihm jedoch völlig gleichgültig.—Leanders Träumereien.

1. oak. 2. beech. 3. thoughtful.

Reinhardt wurde um die Mitteilung einiger Volkslieder gebeten, welche er am Nachtmittage von einem auf dem Lande wohnenden Freunde geschickt bekommen hatte. Er ging auf sein Zimmer, und kam gleich darauf mit einer Papierrolle zurück, welche aus einzelnen, sauber geschriebenen Blätten zu bestehen schien.

Man setzte sich an den Tisch, Elisabeth an Reinhardts Seite. „Wir lesen auf gut Glück," sagte er, „ich habe sie selber noch nicht durchgesehen."

Elisabeth rollte das Manuscript auf. „Hier sind Noten," sagte sie; „das muszt du singen, Reinhardt."

Und dieser las nun zuerst einige tiroler Lieder, indem er beim Lesen zuweilen die lustige Melodie mit halber Stimme anklingen liesz. Eine allgemeine Heiterkeit [2] bemächtigte [3] sich der kleinen Gesellschaft. „Wer hat doch aber die schönen Lieder gemacht?" fragte Elisabeth.

Reinhardt sagte: „Sie werden gar nicht gemacht; sie wachsen, sie fallen aus der Luft, sie fliegen über Land, hierhin und dorthin, und werden an tausend Stellen zugleich gesungen. Unser eigenstes Thun und Leiden finden wir in diesen Liedern; es ist, als ob wir alle an ihnen mitgeholfen hätten."

1. at random. 2. merriment. 3. to take possession of.

VII.—FRENCH.

1. Give with examples:

a—rules for forming the plural of French nouns.

b—rules for the position of French adjectives.

c—the difference in the use of the interrogative as a relative pronoun.

2. Write in the singular: the present indicative of *savoir, devoir, croire.* The future of *savoir, faire, aller.* The present and imperfect subj. of *savoir, dire, venire, valoir.*

3. Give the principal parts of: *Tenir, mourir, pleuvoir pouvoir. conduire, craindre, croire.*

4. Give the forms necessary to complete the following:

singular.			plural.		
masc.		fem.	masc.		fem.
ce cet,					
notre,					
le mien,					
lequel,					
celui.					

Translate into French:

1. The boy is as handsome as his beautiful cousin.
2. They have been in all the schools of this whole city.

3. Saturday, August twelfth, eighteen-hundred and ninety-eight I shall be in the country at my aunts.

4. Do not give it to them; give it to me.

5. She must start now in order to arrive before he leaves.

6. Go and get the books and pens I gave you yesterday.

7. The person whom I have heard singing is neither my brother nor his sister.

8. *a*, An old soldier; *b*, a round table; *c*, he is cold; *d*, Henry, the Fifth; *e*, many good books; *f*, it is warm.

Translate into English:

Le domestique à cheveux gris qui m'avait, reçu à mon arrivée, et qui se nomme Alain, m'attendait dans le vestibule pour me dire, de la part de Mme Laroque, que je n'avais plus le temps de visiter mon logement avant le dîner que j'étais bien comme j'étais. Au moment même où j'entrais dans le salon, une société d'une vingtaine de personnes en sortait avec les cérémonies d'usage pour se rendre dans la salle à manger. C'était la première fois, depuis le changement de ma condition, que je me trouvais mêlé à une réunion mondaine. Habitué naguère[1] aux petites distinctions que l'étiquette des salons accorde en général à la naissance et à la fortune, je n'ai pas reçu sans amertume[2] les premiers témoignages de la négligence et du dédain auxquels me condamné inévitablement ma situation nouvelle. Réprimant de mon mieux les révoltes de la fausse gloire, j'ai offert mon bras à une juene fille de petite taille[3] mais bien faite et gracieuse, qui restait, seule en arrière de tous les convives, et qui etait, comme je l'ai supposé, Mlle Hélouin, l'institutrice. Ma place était marquée à table près de la sienne.

1. scarcely. 2. bitterness. 3. statue.

En 1726, un jeunne homme de Normandie, appelé M. de La Tour, aprés avoir sollicité en vain du service en France et des secours dans sa famille, se détermina à venir dans cette ile pour y chercher fortune. Il avait avec lui une jeune femme qu'il aimait beaucoup, et dont il était également aimé. Elle était d'une ancienne et riche maison de sa province, mais il l'avait épousée[1] en secret et sans dot[2] parce que les parents de sa femme s'étaient opposés à son mariage, attendu[3] qu'il n'était pas gentilhomme.

Il la laissa au Port Louis de cette île et il s'embarqua pour Madagascar, dans l'espérance [4] d'y acheter quelques noirs, et de revenir promptement ici former une habitation. Il débarqua à Madagascar vers la mauvaise saison, qui commence à la mi-octobre; et, peu de temps après son arrivée, il y mourut des fièvres pestilentielles qui y règnent pendant six mois de l'année, et qui empêcheront [5] toujours les nations européennes d'y faire des établissements fixes. Les effets qu'il avait emportés [6] avec lui furent dispersés après sa mort; comme il arrive ordinairement à ceux qui meurent hors de leur patrie. Sa femme, restée à l'Ile de France, se trouva veuve [7] et n'ayant pour tout bien [8] au monde qu'une négresse, dans un pays où elle n'avait ni crédit, ni recommandation.

1. married. 2. marriage portion. 3. seeing. 4. hope. 5. to prevent. 6. carried away. 7. widow. 8. property.

VIII.—LATIN.

I. Grammar.

[In writing Latin words of more than two syllables, mark the quantity of the penult.]

1. Decline *Lucius Sulla, Aeneas, deus, lacus, os* (a bone), *os* (the mouth), *tu, is, felix.* Give the rules for determining the gender of nouns.

2. What words are declined like *alius* and what is their peculiarity?

3. Form adverbs from the following adjectives and then compare them: *fortis, altus.* Compare *parvus, aeger.*

4. Write in Latin 1899.

5. Give the present indicative of *nolo, possum, eo.*

6. Explain the formation of the different parts of the active voice of the verb and give the scheme of endings.

7. What are the principal parts of *soleo, tono, vicerunt.*

8. Give the first person of each tense of *audio* in the passive.

9. State the rules for the use of moods and tenses in the indirect discourse.

10. Mention the various ways of expressing purpose, with examples.

II. Caesar.

Translate (Bk. II, 11):—

Ea re constituta, secunda vigilia magno cum strepitu ac tumultu castris egressi, nullo certo ordine neque imperio, cum sibi quisque primum itineris locum peteret et domum pervenire properaret, fecerunt ut consimilis fugae profectio videretur. Hac re statim Caesar per speculatores cognita, insidias veritus, quod qua de causa discederent nondum perspexerat, exercitum equitatumque castris continuit. Prima luce, confirmata re ab exploratoribus, omnem equitatum qui novissimum agmen moraretur praemisit.

What time is meant by *secunda vigilia?* Give construction of *fugae, domum, moraretur.*

Translate (Bk. IV, §19):—

Caesar, paucos dies in eorum finibus moratus, omnibus vicis aedificiisque incensis, frumentisque succisis, se in fines Ubiorum recipit; atque iis auxilium suum pollicitus, si ab Suevis premerentur, haec ab iis cognovit: 'Suevos, posteaquam per exploratores pontem fieri comperissent, more suo concilio habito, nuntios in omnes partes dimisisse, uti de oppidis demigrarent, liberos, uxores, suaque omnia in silvis deponerent, atque omnes, qui arma ferre possent unum in locum convenirent.'

Change the speech to direct discourse.

III. Cicero.

Translate (Cat. I. §27):—

Etenim si mecum patria, quae mihi vita mea multo est carior, si cuncta Italia, si omnis res publica loquatur: 'M. Tulli, quid agis? Tune eum quem esse hostem comperisti, quem ducem belli futurum vides, quem exspectari imperatorem in castris hostium sentis, auctorem sceleris, principem conjurationis, evocatorem servorum et civium perditorum, exire patiere, ut abs te non emissus ex urbe, sed immissus in urbem esse videatur?'

Explain the construction of the subjunctives in the passage. Give the abbreviations of such *praenomina* as you recall.

Translate (*Cat. III.* §*10*).—

Ac ne longum sit, Quirites, tabellas proferri jussimus, quae a quoque dicebantur datae. Primum ostendimus Cethego signum: cognovit. Nos linum incidimus: legimus. Erat scriptum ipsius manu Allobrogum senatui et populo, sese quae eorum legatis confirmasset esse; orare ut item illi facerent quae sibi eorum legati recepissent.

How were Roman letters written and secured? Where did the Allobroges dwell? Give syntax of *orare* and *sibi*.

Translate (*Archias*, §*22*):—

Carus fuit Africano superiori noster Ennius, itaque etiam in sepulcro Scipionum putatur is esse constitutus ex marmore. At eis laudibus certe non solum ipse qui laudatur, sed etiam populi Romani nomen ornatur. In caelum hujus proavus Cato tollitur: magnus honos populi Romani rebus adjungitur. Omnes denique illi Maximi, Marcelli, Fulvii non sine communi omnium nostrum laude decorantur.

Translate (*Manilian Law*, §*27*):—

Utinam, Quirites, virorum fortium atque innocentium copiam tantam haberetis, ut haec vobis deliberatio difficilis esset, quemnam potissimum tantis rebus ac tanto bello praeficiendum putaretis! Nunc vero—cum sit unus Gn. Pompeius, qui non modo eorum hominum qui nunc sunt gloriam, sed etiam antiquitatis memoriam virtute superarit—quae res est quae cujusquam animum in hac causa dubium facere possit?

State under what classes the conjunctions in this passage belong.

IV. Vergil.

Translate (*Aen. I, 664*):—

Nate, meae vires, mea magna potentia solus,
Nate, patris summi qui tela Typhoia temnis,
Ad te confugio et supplex tua numina posco.
Frater ut Aeneas pelago tuus omnia circum
Litora jactetur odiis Junonis iniquae,
Nota tibi, et nostro doluisti saepe dolore.

When and by whom were these lines supposed to have been spoken? Give the full name of the meter of the first line.

Translate (*Aen V, 104*):—

Expectata dies aderat, nonamque serena
Auroram Phaëthontis equi jam luce vehebant,
Famaque finitimos et clari nomen Acestae
Excierat; laeto complerant litora coetu,
Visuri Aeneadas, pars et certare parati.
Munera principio ante oculos circoque locantur
In medio, sacri tripodes viridesque coronae
Et palmae, pretium victoribus, armaque et ostro
Perfusae vestes, argenti aurique talenta;
Et tuba commissos medio canit aggere ludos.

What other form does *complerant* have? Write out the fifth and sixth lines of this passage, dividing them into feet, marking the quantity of each syllable and indicating the caesuras. What was the story of Phaëthon?

V. Latin at Sight.

Hae permanserunt aquae dies complures. Conatus est Cæsar reficere pontes, sed nec magnitudo fluminis permittebat neque ad ripam dispositae cohortes adversariorum perfici patiebantur; quod illis prohibere erat facile cum ipsius fluminis natura atque aquae magnitudine, tum quod ex totis ripis in unum atque angustum locum tela jaciebantur; atque erat difficile eodem tempore rapidissimo flumine opera perficere et tela vitare.—*Caes B. Civ. I, 50.*

VI. Latin Prose Composition.

Romulus, in order to increase (*augeo*) the number of the citizens, established (*patefacio*) an asylum (*asylum*) to which many who had been banished from their own cities (*civitas*) fled. But wives were lacking (*desum*) for the citizens of the new city. And so he instituted a festival (*festum*) and games to Neptune (*Neptunus*). When many from the neighboring peoples had come to these along with (*cum*) their wives and children, the Romans carried off (*rapio*) the maidens (*virgo*) while they were looking

at the games. Those tribes (*populus*), whose maidens had been carried off, began (*suscipio*) war against (*adversus*) the captors (*raptor*).

VII. Roman History.

1. Tell the story of the War with Pyrrhus.
2. What were the main events in the life of Cicero.
3. Give an outline of the Second Punic War.
4. Who were the Decemvirs, when did they live, and what did they do?
5. What reforms did the Gracchi seek to bring about?

GREEK.

I. Grammar.

1. Write with accents and breathings *τινες ουν ουτοι οι ανθρωποι εισιν, βουλομαι υμιν λεγειν· ουτοι εισιν Ελληνες τινες, οι παρα βασιλεως ηκουσιν.*

2. Write correctly *τέτριβται, νυκτσί, λέλειπμαι, ενγίγνομαι, γέγραφσθαι, πέπειθται, ἐθέθην*, and give reason in each case.

3. Write contracted forms of *δηλόητε, τείχεα, τιμάου, τιμάεαι, ἰχθύες.*

4. Write the genitive, singular and plural, of *θάλασσα, ναῦς, πόλις*; the dative, singular and plural, of *γυνή, κύων, μήτηρ*; the accusative, singular and plural, of *βασιλεύς, πόλις, ἐλπίς, νοῦς.*

5. Decline throughout *πᾶς, μέγας, μέλας, ἀληθής.*

6. Compare *σώφρων, αἰσχρός.* Form adverbs, and compare, from *σοφός, πολύς.*

7. Give synopsis of second aorist passive of *φαίνω*; perfect passive of *τάσσω*; second aorist active of *ἵστημι*; present active of *δίδωμι.*

8. Inflect the indicative of *οἰδα* (perfect and pluperfect); the optative of *εἰμι*; the second aorist subjunctive of *ἵημι.*

9. *ἕλοι, ἁλοίη, αἱρεθείη, αἱροίη*: *τιθῶ, φανῶ, λυθῶ, τεθῶ, θῶ, ἐτύψω, ἵστω, εἰδῶ, ἐδίδω*: where made? present?

10. Distinguish between *βούλευσαι, βουλεῦσαι, βουλεύσαι.*

II. Anabasis.

1. State briefly the object of Cyrus's expedition and the outcome of the battle of Cunaxa.

2. Translate into idiomatic English:

μετὰ τοῦτον ἄλλος ἀνέστη, ἐπιδεικνὺς μὲν τὴν εὐήθειαν τοῦ τὰ πλοῖα αἰτεῖν κελεύοντος, ὥσπερ πάλιν τὸν στόλον Κύρου ποιουμένου, ἐπιδεικνὺς δὲ ὡς εὔηθες

εἴη ἡγεμόνα αἰτεῖν παρὰ τούτου ᾧ λυμαινόμεθα τὴν πρᾶξιν. εἰ δὲ καὶ τῷ ἡγεμόνι πιστεύσομεν ὃν ἂν Κῦρος διδῷ, τί κωλύει καὶ τὰ ἄκρα ἡμῖν κελεύειν Κῦρον προκαταλαμβάνειν; ἐγὼ γὰρ ὀκνοίην μὲν ἂν εἰς τὰ πλοῖα ἐμβαίνειν ἃ ἡμῖν δοίη, μὴ ἡμᾶς αὐταῖς ταῖς τριήρεσι καταδύσῃ, φοβοίμην δ' ἂν τῷ ἡγεμόνι ᾧ δοίη ἕπεσθαι, μὴ ἡμᾶς ἀγάγῃ ὅθεν οὐχ οἷόν τε ἔσται ἐξελθεῖν· βουλοίμην δ' ἂν ἄκοντος ἀπιὼν Κύρου λαθεῖν αὐτὸν ἀπελθών· ὃ οὐ δυνατόν ἐστιν.

1. Force of *ὥσπερ* with participle? 2. Explain voice and tense of *ποιουμένου*. 3. Conform second *ἐπιδεικνύς* clause to first. 4. Explain difference of construction between *αἰτεῖν* (l. 1) and *αἰτεῖν* (l. 3). 5. Construction of *ᾧ* (l.3)? Might this have been *οὗ*? Why? 6. Explain fully the conditional sentence *εἰ . . . . πιστεύσομεν . . . . . , τί κωλύει*; Write in Greek: if we trusted the guide, what would prevent, etc. 7. Explain use of *ἂν* after relative (*ὃν ἂν διδῷ*). 8. Construction of *ὀκνοίην, δοίη, ἀγάγῃ*? 9. Construction of *αὐτόν*; of *ἀπελθών*. 10. Antecedent of *ὅ*?

3. Translate into idiomatic English:

Ἐπεὶ δὲ πειρωμένοις τό τε ὕδωρ ὑπὲρ τῶν μαστῶν ἐφαίνετο, καὶ τραχὺς ἦν ὁ ποταμὸς μεγάλοις λίθοις καὶ ὀλισθηροῖς, — καὶ οὔτ' ἐν τῷ ὕδατι τὰ ὅπλα ἦν ἐχειν, εἰ δὲ μή, ἥρπαζεν ὁ ποταμός· ἐπί τε τῆς κεφαλῆς τὰ ὅπλα εἴ τις φέροι, γυμνοὶ ἐγίγνοντο πρὸς τὰ τοξεύματα καὶ τἆλλα βέλη,—ἀνεχώρησαν, καὶ αὐτοῦ ἐστρατοπεδεύσαντο παρὰ τὸν ποταμόν.

Construction of *πειρωμένοις*? Force of the tense of *ἐγίγνοντο*? Reason for the mode of *φέροι*?

4. At sight:

Ἐπεὶ δ' ἦκον, ἐκκλησίαν ἐποίησαν, ἐν ᾗ ἀντέλεγον Κορίνθιοι καὶ Θηβαῖοι μάλιστα, πολλοὶ δὲ καὶ ἄλλοι τῶν Ἑλλήνων, μὴ σπένδεσθαι Ἀθηναίοις, ἀλλ' ἐξαιρεῖν. Λακεδαιμόνιοι δὲ οὐκ ἐφασαν πόλιν Ἑλληνίδα ἀνδραποδιεῖν μέγα ἀγαθὸν εἰργασμένην ἐν τοῖς μεγίστοις κινδύνοις γενομένοις τῇ Ἑλλάδι, ἀλλ' ἐποιοῦντο εἰρήνην ἐφ' ᾧ τά τε μακρὰ τείχη καὶ τὸν Πειραιᾶ καθελόντας καὶ τὰς ναῦς πλὴν δώδεκα παραδόντας καὶ τοὺς φυγάδας καθέντας τὸν αὐτὸν ἐχθρὸν καὶ φίλον νομίζοντας Λακεδαιμονίοις ἕπεσθαι καὶ κατὰ γῆν καὶ κατὰ θάλατταν ὁποι ἂν ἡγῶνται.

σπένδεσθαι: to make a treaty. *καθαιρεῖν*: to destroy. *ἐξαιρεῖν*: to destroy utterly. *καθιέναι*: to restore. *ἀνδραποδίζειν*: to enslave.

III. Homer.

1. Translate:

Τῶν δ', ὥστ' ὀρνίθων πετεηνῶν ἐθνεα πολλά,
χηνῶν ἢ γεράνων ἢ κύκνων δουλιχοδείρων,
Ἀσίῳ ἐν λειμῶνι, Καϋστρίου ἀμφὶ ῥέεθρα,
ἔνθα καὶ ἔνθα ποτῶνται ἀγαλλόμενα πτερύγεσσιν,
κλαγγηδὸν προκαθιζόντων, σμαραγεῖ δέ τε λειμών,
ὡς τῶν ἔθνεα πολλὰ νεῶν ἄπο καὶ κλισιάων
ἐς πεδίον προχέοντο Σκαμάνδριον· αὐτὰρ ὑπὸ χθὼν
σμερδαλέον κονάβιζε ποδῶν αὐτῶν τε καὶ ἵππων.
ἔσταν δ' ἐν λειμῶνι Σκαμανδρίῳ ἀνθεμόεντι
μυρίοι, ὅσσα τε φύλλα καὶ ἄνθεα γίγνεται ὥρῃ.

What event is described in these lines and what was its occasion?

2. (Antenor compares Menelaus with Odysseus.)
Translate:

ἀλλ' ὅτε δὴ μύθους καὶ μήδεα πᾶσιν ὑφαινον,
ἤτοι μὲν Μενέλαος ἐπιτροχάδην ἀγόρευεν,
παῦρα μὲν, ἀλλὰ μάλα λιγέως, ἐπεὶ οὐ πολύμυθος
οὐδ' ἀφαμαρτοεπὴς, εἰ καὶ γένει ὕστερος ἦεν.
ἀλλ' ὅτε δὴ πολύμητις ἀναΐξειεν Ὀδυσσεύς,
στάσκεν, ὑπαὶ δὲ ἴδεσκε κατὰ χθονὸς ὄμματα πήξας,
σκῆπτρον δ' οὔτ' ὀπίσω οὔτε προπρηνὲς ἐνώμα,
ἀλλ' ἀστεμφὲς ἔχεσκεν, ἀίδρεῖ φωτὶ ἐοικώς·
φαίης κε ζάκοτόν τέ τιν' ἔμμεναι ἄφρονά τ' αὔτως·
ἀλλ' ὅτε δὴ ὄπα τε μεγάλην ἐκ στήθεος εἵη
καὶ ἔπεα νιφάδεσσιν ἐοικότα χειμερίῃσιν,
οὐκ ἂν ἔπειτ' Ὀδυσῆΐ γ' ἐρίσσειε βροτὸς ἄλλος·

IV. History.

1. Give a brief account of Draco; of Solon; of Cleon; of Lysander.
2. Where was Leuctra? When was the battle of Leuctra fought? Who were the combatants? What was the result?
3. Who was Cleisthenes? What did he do?
4. When did the Peloponnesian War begin? When did it come to an end? Where was the last battle fought? What were its results?
5. Give a brief account of the life of Demosthenes.

STUDENTS.

A.C.—Analytical Chemistry.
Arch.—Architecture.
C.E.—Civil Engineering.
Clas.—Classical.
E.E.—Electrical Engineering.
E.M.—Mining Engineering.
L.S.—Latin-Scientific.
M.E.—Mechanical Engineering.
Met.—Metallurgical Engineering.
Sci.—Science and Letters.

GRADUATE STUDENTS.

	For Degree.	Residence.
Albert Green Caldwell, A.B.,	E.M.,	Trenton, Tenn.
Henry M. S. Cressman, B.A.,	M.A.,	Egg Harbor City, N.J.
Frank Oliver Dufour, C.E.,	M.S.,	South Bethlehem.
Howard M. Gassman, A.B.,	M.E.,	Hagerstown, Md.
Ernest M. Hill, B.S.,	M.E.,	Baltimore, Md.
Elmer Aug. Jacoby, B.A.,	M.A.,	Pennsburg.
Arthur Warner Klein, M.E.,		Bethlehem.
Henry Kemmerling, C.E.,	M.S.,	Scranton.
Jacob B. Krause, B.A.,	M.A.,	South Bethlehem.
E. Williamson Miller, E.M.,	M.E.,	South Bethlehem.
David K. Nicholson, M.E.,	M.S.,	Braddock.
Percy Lawrence Reed, C.E.,	M.S.,	New Bedford, Mass.
William Harold Speirs, B.S.,	C.E.,	St. Louis, Mo.
Charles W. Startsman, B.S.,	E.E.,	Iowa City, Ia.
Martin S. Stockett, B.A.,	M.A.,	New York, N.Y.
Clinton G. Tudor, B.A.,	C.E.,	Sault Ste. Marie, Mich.
Winter L. Wilson, C.E.,	M.S.,	Bethlehem.

SENIOR CLASS.

	Course.	Residence.
Louis Benjamin Abbott,	C.E.,	Carbondale.
George William Barager,	M.E.,	Hazleton.
Albert William Bayard,	M.E.,	Washington, D.C.
Berthold Graeff Beck,	E.E.,	West Bethlehem.
Thomas Francis Bell,	M.E.,	Shenandoah.

	Course.	Residence.
John Francis Benson,	C.E.,	Portsmouth, Va.
Russell Julian Borhek,	C.E.,	West Bethlehem.
Henry Lawton Bowers,	A.C.,	Detroit, Mich.
Andrew Thomas Brice,	E.E.,	New York, N.Y.
John James Brice,	C.E.,	New York, N.Y.
Joseph William Burke,	E.M.,	Shenandoah.
David Hastings Canfield,	Arch.,	Middletown, N.Y.
Robert William Canning,	M.E.,	South Bethlehem.
Morrow Chamberlain,	E.M.,	Chattanooga, Tenn.
George Curtis Coutant,	M.E.,	High Falls, N.Y.
John Kenelm Digby,	E.M.,	Paris, France.
Herbert Charles Dilliard,	C.E.,	East Bangor.
Alan Craig Dodson,	L.S.,	Bethlehem.
Truman Monroe Dodson, 2d.,	Sci.,	Bethlehem.
William T. Drake,	M.E.,	Old Forge.
Nimson Eckert,	Clas.,	Allentown.
John William Fletcher,	M.E.,	Skowhegan, Me.
Richard McNamee Freeman,	E.E.,	Andover, N.J.
John Fuller,	M.E.,	Quarryville, N.J.
Author Hendrix Gill,	M.E.,	Boring, Md.
Frederick Augustus Groff,	E.E.,	Rome, N.Y.
Charles Frederick Gross,	C.E.,	Belvidere, N.J.
William B. Grubbe,	C.E.,	Pine Plains, N.Y.
Arthur Bradley Hanscom,	C.E.,	Philadelphia.
John George Heinz,	E.M.,	Louisville, Ky.
Albert Darby Hollingsworth,	C.E.,	Scotch Plains, N.J.
Michael James Honan,	E.E.,	Oxford, N.J.
Edward Melville Huggins,	M.E.,	Philadelphia.
John Edward Leibfried,	A.C.,	Bethlehem.
George Craig Leidy,	C.E.,	Washington, D.C.
William Grant Lessig,	M.E.,	Shenandoah.
Herbert Spencer Lewis,	C.E.,	Baltimore, Md.
Thomas Windle Lukens,	E.M.,	Atglen.
Charles Edward Terry Lull,	E.M.,	Trenton, N.J.
Garth Bainbridge Luten,	C.E.,	Cayce, Ky.
William Thomas McCarthy.	Arch.,	Schenectady, N.Y.
Kenneth Wesley McComas,	A.C.,	South Bethlehem.
William George McVey,	C.E.,	South Bethlehem.
Carl Edward Maeder,	M.E.,	Pittsburg.

	Course.	Residence.
Joseph Patrick Martin,	C.E.,	Plymouth.
Manuel de la Mora,	C.E.,	Guadalajara, Mex.
George Rohrer Morrow,	E.M.,	Highspire.
Louis Ortner,	M.E.,	Drifton.
Arthur Rose Parsons,	E.M.,	Salt Lake City, Utah.
Norman Spearman Powell,	E.M.,	West Middlesex.
Joseph Jacob Reamer,	C.E.,	Waterloo, N.Y.
John Nicholas Reese,	C.E.,	Harrisburg.
George Loomis Robinson,	C.E.,	Elmira, N.Y.
James George Ross,	C.E.,	Kittanning.
Charles Edward Rowe,	M.E.,	Philadelphia.
Armando Sanchez,	E.M.,	Nuevitas, Cuba.
Edmund Trowbridge Satchell,	A.C.,	Philadelphia.
Joseph Stauffer Shultz,	C.E.,	Washington Boro.
Walter S. Smith,	C.E.,	Forty Fort.
Charles Sylvanus Snyder,	M.E.,	Bethlehem.
Arturo Solorzano,	M.E.,	Managua, Nicaragua.
William Paul Starkey,	M.E.,	Philadelphia.
John Alvin Strauss,	E.E.,	Sayre.
Henry Adolph Tobelmann,	E.M.,	Basking Ridge, N.J.
John Ralph VanDuyne,	C.E.,	Newark, N.J.
William Penn White,	E.E.,	Washington, D.C.
Toros Asadur Yasharian,	E.E.,	Hedjin, Armenia.
Edward Abraham Yellis,	Sci.,	Weaversville.
Edward Robins Zalinski,	E.M.,	Rochester, N.Y.

JUNIOR CLASS.

	Course.	Residence.
Samuel Ray Alder,	E.M.,	Redlands, Cal.
Paul Lewis Anderson,	E.E.,	Somerville, N.J.
Joaquim Gregoriano de Andrade,	M.E.,	Manáos, Brazil.
Frederick Arthur Armstrong,	E.E.,	Brooklyn, N.Y.
Charles Elmer Barba,	M.E.,	Allentown.
Edwin Percy Bigelow,	E.E.,	Oxford, N.J.
Reginald Weller Bours,	C.E.,	Jacksonville, Fla.
John Hall Bower,	E.M.,	Myerstown.
Newton Wayne Buch,	A.C.,	Lancaster.
Albert Adam Canning,	E.M.,	South Bethlehem.
William Deakins Cassin,	E.E.,	Washington, D.C.

	Course.	Residence.
Hugh Banks Chapman,	E.E.,	St. Elmo, Tenn.
David Bean Clark,	Clas.,	Richlandtown.
Richard Cromwell Congdon,	M.E.,	Baltimore, Md.
Robert Milton Cortright,	A.C.,	Bethlehem.
John Henry Crane,	E.M.,	Chicago, Ill.
Francis Donaldson,	M.E.,	Baltimore, Md.
Gavin Hogg Dortch,	E.E.,	Goldsboro, N.C.
William Albert Ehlers,	M.E.,	Hernwood, Md.
Charles Enzian,	C.E.,	Weissport.
Cadwallader Evans, jr.,	M.E.,	Pittsburg.
John Henry Flory,	E.E.,	Ashley.
Ernesto Franco,	C.E.,	Quito, Ecuador.
Lewis Alfred Freudenberger,	E.E.,	West Bethlehem.
Morris Wilber Garman,	Met.,	Nanticoke.
Frank Benjamin Gearhart,	A.C.,	Altoona.
Thomas Mercer Girdler,	M.E.,	Jeffersonville, Ind.
James Henry Gledhill,	M.E.,	Riegelsville.
Wilbur Wilson Graff,	E.M.,	Rushville, Ill.
Herbert Terry Greene,	E.M.,	New York, N.Y.
Percy Lamar Grubb,	Clas.,	Harrisburg.
Webster Neugard Haas,	C.E.,	Hepler.
Samuel Thomas Harleman,	M.E.,	South Bethlehem.
Ellwood Scott Harrar,	E.E.,	Allentown.
Frederick Apple Hausman,	C.E.,	Allentown.
Samuel Parke Heitshu,	C.E.,	Lancaster.
Edmund Percival Jump,	M.E.,	Easton, Md.
Clark Miles Knight,	M.E.,	Ashland, Wis.
Louis Gustave Krause,	C.E.,	Absecon, N.J.
John Stauffer Krauss,	E.E.,	East Greenville.
Samuel Townsend Laubach,	M.E.,	Northampton.
Mason Benedict Lawton,	C.E.,	Rome, N.Y.
Albert Raymond Laubenstein,	M.E.,	Ashland.
David Graham McGavock,	E.M.,	Graham's Forge, Va.
Charles Joseph McGonigle,	C.E.,	Allentown.
Johnson McVey,	A.C.,	South Bethlehem.
Albert Winfred Mans,	C.E.,	Hazleton.
Conrado Eugenio Martinez,	C.E.,	Habana, Cuba.
J. Louis Meixell,	M.E.,	Parsons, Kan.
Harry Maxwell Menner,	A.C.,	Bethlehem.

	Course.	Residence.
Luther Dwight Menough,	C.E.,	York.
Henry Jarvis Moore,	E.M.,	Gill, Mass.
Robert Cunningham Morris, jr.,	M.E.,	Pottsville.
Edward Thomas Murphy,	M.E.,	Brooklyn, N.Y.
John Joseph Nolan,	M.E.,	Carbondale.
Harry Edward Packer,	M.E.,	South Bethlenem.
Frederick Jay Payne,	M.E.,	Copenhagen, N.Y.
Everett Johnson Peck,	M.E.,	Plainfield, N.J.
John Hazelrod Pomeroy,	M.E.,	Ridley Park.
John Vincent Rittenhouse,	E.E.,	Plainfield, N.J.
Walter Henry Rodney,	C.E.,	Baltimore, Md.
Ferdinand W. Roebling, jr.,	M.E.,	Trenton, N.J.
James C. Ryan,	E.E.,	Harrisburg.
Alfredo Jorge Sanchez,	A.C.,	Matanzas, Cuba.
Albert Clinton Savidge,	E.E.,	Sunbury.
John Wallace Shaeffer,	M.E.,	Fleetwood.
Herbert Spencer Stauffer,	C.E.,	South Bethlehem.
Herman Arnold Straub,	C.E.,	Pittsburg.
John Fife Symington,	M.E.,	Baltimore, Md.
Richard Ferrier Taylor,	E.E.,	Bethlehem.
Edward T. Thornton,	E.M.,	Philadelphia.
Grandison Gridley Underhill,	C.E.,	East Aurora, N.Y.
James Strawbridge VanAlen,	E.E.,	Northumberland.
George William Welsh,	E.E.,	Hanover.
John Whitridge,	C.E.,	Baltimore, Md.
Edwin Benton Wilkinson,	A.C.,	Williamsport.
Henry Dalzell Wilson,	M.E.,	Pittsburg.
Tuck Ching Strong Yen,	C.E.,	Shanghai, China.
Arthur Reuben Young,	C.E.,	West Bethlehem.

SOPHOMORE CLASS.

	Course.	Residence.
Arthur Garfield Bachman,	A.C.,	Lancaster.
Felix Bareis, jr.,	M.E.,	Cumberland, Md.
William Frederick Berger,	M.E.,	South Bethlehem.
Robert Montgomery Bird,	M.E.,	South Bethlehem.
Allan Gordon Bohannon,	E.E.,	Hickory, N.C.
William Smith Brownell, jr.,	C.E.,	Newport, R.I.
Timothy Burns,	M.E.,	Yankton, S.D.

	Course.	Residence.
William Taggart Carpenter,	C.E.,	Pittston.
Luis Cuesta,	C.E.,	Guadalajara, Mex.
John Atkinson Cunningham,	E.E.,	Henderson, Ky.
James Mitchell Daniel, jr.,	E.M.,	Paris, Tex.
Alpha Albert Diefenderfer,	A.C.,	Allentown.
James Nethermark Downey,	E.E.,	Lancaster.
Claudio Dumás,	E.E.,	Matanzas, Cuba.
Edward Randolph Eichner,	C.E.,	Hoboken, N.J.
William L. Fleming,	E.M.,	New Castle.
Josef Blackburn Freund,	E.E.,	Washington, D.C.
Henry LeRoy Fryer,	C.E.,	Chester.
Cástulo Gallardo,	C.E.,	Guadalajara, Mex.
Cástulo Martinez Gallardo,	C.E.,	Guadalajara, Mex.
Thomas K. Reed Gardner,	C.E.,	Egg Harbor City, N.J.
John Thomas Gavan,	C.E.,	Scranton.
William Berger Geiser,	Sci.,	Bath.
William Mahlon Gilbert,	E.E.,	Lo Lo, Mont.
Peter William Gleason,	M.E.,	South Bethlehem.
Felix Golian,	C.E.,	Phoenixville.
Charles Albert Gradwohl,	A.C.,	South Bethlehem.
William Thomas Griffith,	E.M.,	Kane.
Robert Franklin Gross,	E.M.,	Bethlehem.
Maximilian Showzo Hachita,	E.M.,	Sanuki, Japan.
William Rankin Hall,	C.E.,	Middletown, Del.
George Wellington Hamilton,	E.E.,	Pottsville.
Walter Scott Hanna,	C.E.,	Lykens.
John O'Connor Hederman,	C.E.,	Hornellsville, N.Y.
John S. Hegeman,	M.E.,	Bethlehem.
William Louis Heim,	A.C.,	Kane.
Foster Hewett,	E.M.,	Colorado Springs, Col.
Edwin Higgins, jr.,	E.M.,	Washington, D.C.
Joseph Earl Hill,	E.E.,	Bethlehem.
Albert Cass Hutchinson,	C.E.,	Mishawaka, Ind.
Robert Jarecki,	M.E.,	Erie.
William Henry Jaxheimer,	M.E.,	Bethlehem.
Walter Scott Johns,	C.E.,	Martindale.
John Patrick Kelly,	C.E.,	Salamanca, N.Y.
Charles Edgar Kendig,	E.E.,	Baltimore, Md.
George Maisch Kennedy,	E.E.,	Pottsville.

	Course.	Residence.
Walter Savage Landis,	E.M.,	Pottstown.
Ricardo León,	M.E.,	Chiapas, Mex.
Frederick Farrar Lines,	E.M.,	Bethlehem.
Myron Jacob Luch,	Clas.,	Santee.
Joseph Treanor McNaier,	E.E.,	Yonkers, N.Y.
Elmer McClellan Milheim,	E.E.,	Bloomsburg.
Robert Hopkins Moffitt, jr.,	E.M.,	Harrisburg.
William Lloyd Morgan,	C.E.,	Harwood Mines.
Charles Edwin Pugh Murray,	C.E.,	Columbia.
Floyd William Parsons,	E.M.,	Grafton, W.Va.
William Frank Roberts,	M.E.,	Freeland.
William Perry Rogers,	M.E.,	Latrobe.
Daniel Martin Sachs, jr.,	M.E.,	Gowen.
Carlos Nathaniel Scovil,	M.E.,	Copenhagen, N.Y.
James Cadwalader Sellers, jr.,	E.E.,	West Chester.
William Roy Shively,	M.E.,	Philadelphia.
John J. Shonk, jr.,	M.E.,	Plymouth.
Joseph Aiken Simons,	E.E.,	Charleston, S.C.
William Penn Slifer,	C.E.,	Bingen.
Paul Helsel Smith,	E.E.,	Butler.
Edmund Sewell Stevens,	C.E.,	Allentown.
William Ernest Thomas,	E.M.,	Philadelphia.
Robert William Thoroughgood,	C.E.,	Georgetown, Del.
George Wiliam Webb,	M.E.,	South Bethlehem.
James Brookes Wright,	C.E.,	S. McAlester, Ind.Ty.
Thomas Wilbraham Wright,	A.C.,	Philadelphia.

FRESHMAN CLASS.

	Course.	Residence.
Richard Lattimer Adams,	C.E.,	Harrisburg.
Ernest Augustus Andrews, jr.,	M.E.,	Kingston, Jamaica.
Henry Campbell Avery,	M.E.,	Westfield, Mass.
Howard Leffingwell Baldwin,	C.E.,	Allentown.
Norman Zabriskie Ball,	C.E.,	Whippany, N.J.
Arthur Deans Barrett,	C.E.,	New York, N.Y.
James C. Barton,	C.E.,	Coatesville.
Thomas Beaghen, jr.,	M.E.,	Hancock, N.Y.
Luther Becker,	M.E.,	Schuylkill Haven.
Sylvanus A. Becker,	C.E.,	Nazareth.

	Course.	Residence.
John Halsey Bonsall,	E.E.,	Dover, N.J.
William Reuben Bray,	E.E.,	Wanamie.
Herbert L. Bright,	E.E.,	Bernville.
John André Brodhead,	L.S.,	Bethlehem.
Willard Lynn Bruner,	A.C.,	Philadelphia.
Carleton Ward Buell,	C.E.,	Plymouth, Conn.
Charles Ely Butz,	E.E.,	Allentown.
George Wishard Butz,	C.E.,	Schuylkill Haven.
Thomas Leo Cannon,	C.E.,	Allentown.
Dean Jacob Capp,	M.E.,	Lebanon.
Courtland F. Carrier,	A.C.,	Elmira, N.Y.
George Cassedy,	M.E.,	Ashley.
César Castellanos,	C.E.,	Comitan, Chiapas, Mex.
Hiram Sanborn Chamberlain, jr.,	E.M.,	Chattanooga, Tenn.
Franklin Madison Wright, Conkling,	E.E.,	New York, N.Y.
John Joseph Cort,	E.E.,	Latrobe.
Richard Sharpe Cunningham,	M.E.,	Drifton.
Walter Hammer Cunningham,	M.E.,	Tyrone.
Chauncy Shackford Curtis,	M.E.,	New Castle.
John Dallas,	M.E.,	Philadelphia.
Leroy Landis Daniel,	Clas.,	Harrisburg.
Paul Arnold Degener,	M.E.,	New York, N.Y.
Louis De Sauque Dibert,	M.E.,	Johnstown.
Alfred John Diefenderfer,	Clas.,	Bethlehem.
Alexander Lardner Dornin,	M.E.,	Norfolk, Va.
Fred Wilfrid Downs,	C.E.,	Steelton.
Emil August Droll,	M.E.,	Plainfield, N.J.
Clarence Lincoln Eastman,	E.E.,	Waterville, N.Y.
Harry W. Eisenhart,	M.E.,	York.
Edmund M. Erb,	E.E.,	Slatington.
Louis Withers Evans,	M.E.,	Pottstown.
Joseph Faltermayer,	E.E.,	Philadelphia.
Samuel Palmer Felix,	M.E.,	Schuylkill Haven.
Henry Antonio Firpo,	E.E.,	Paris, France.
John Warren Fisher,	C.E.,	Williamsport.
Arthur S. Fluck,	M.E.,	Richland Centre.
Samuel R. Fraim,	M.E.,	Lancaster.

	Course.	Residence.
Clarence J. Frederici,	C.E.,	Auburn.
Arthur Frick,	M.E.,	York.
John Torrey Fuller,	M.E.,	Wilkes-Barre.
Albert Henry Lawrence Garner,	A.C.,	Dover, N.J.
Paul Gerhard,	M.E.,	East Orange, N.J.
Frank Lwood Gernet,	C.E.,	Nazareth.
Walter David Gernet,	C.E.,	Nazareth.
Arthur Simon Gilmore,	Clas.,	Williamsport.
Louis Tracy Girdler,	M.E.,	Jeffersonville, Ind.
Alfred Robinson Glancy,	M.E.,	Washington, D.C.
Ellis Garfield Godshalk,	E.E.,	Kulpsville.
Solomon W. Goldschmidt,	E.E.,	Mount Carmel.
George Kendrick Goodwin,	M.E.,	Sharon Hill.
John Clark Graff,	C.E.,	Rushville, Ill.
Chester B. Graham,	C.E.,	Washington, D.C.
Harry Groman,	C.E.,	South Bethlehem.
Howard Strack Hartman,	M.E.,	Lancaster.
Irad Hawley, jr.,	M.E.,	East Orange, N.J.
Hugh Whitman Haynes,	C.E.,	Allentown.
Nicholas Hunter Heck,	Clas.,	Heckton Mills.
Charles John Hendrickson,	E.E.,	Middletown, N.J.
Ray Livingston Herrick,	E.M.,	Westfield, Mass.
John Walter Hertzler,	M.E.,	Lancaster.
Samuel Hess,	M.E.,	Hellertown.
Charles Conrad Hewitt,	Clas.,	Trenton, N.J.
Eugene Augustus Hildredth,	A.C.,	Wheeling, W.Va.
Edward Lawrence Himmelman,	M.E.,	New York, N.Y.
Jesse Bowman Hirst,	C.E.,	Rosslyn, Va.
Raymond Hunt,	E.E.,	Stockton, N.J.
John Taggart Jones,	M.E.,	New Castle.
Michael Doland Jones,	C.E.,	Rockaway, N.J.
Harvey Ernest Jordan,	Clas.,	Coopersburg.
Willis Robert Jordan,	C.E.,	Bangor.
Ramsey Daniel Kavanaugh,	M.E.,	Williamsport.
Marcus Augustus Keck,	C.E.,	Bethlehem.
Bert Moss Kent,	M.E.,	Rome, N.Y.
Robert Charles King.	E.E.,	Hanoverville.
Albert Richard Knight,	Clas.,	Bethlehem.

	Course.	Residence.
Paul T. Krause,	A.C.,	Bethlehem.
Charles Irwin Lattig,	E.E.,	West Bethlehem.
Herbert Houghton Lauer,	E.E.,	Philadelphia.
Gay Breton Leroux,	C.E.,	Annapolis, Md.
George Murray Lewis,	C.E.,	Seneca Falls, N Y.
John K. Lilley,	E.E.,	Coatesville.
Allen Ledyard Lindley,	E.M.,	New York, N.Y.
William Alexander Linn,	M.E.,	Hamburg, N.J.
Milton Brentwood Litch,	E.M.,	Steelton.
Jesus Paul Lobo,	C.E.,	Monclova, Coahuila, Mexico.
Canby Guy Lord,	Clas.,	Williamsport.
John McCleary, jr.,	C.E.,	Germantown.
Alexander McCulloch,	C.E.,	Point Pleasant, W.Va.
Amos K. Mackie,	E.E.,	Fair Hill, Md.
Charles Edwin Marks,	E.E.,	Sound Beach, Conn.
James Smith Means,	C.E.,	Shippensburg.
José M. Mendoza,	M.E.,	Lima, Peru.
Winfield Roy Mercer,	M.E.,	Brooklyn, N.Y.
George S. Messinger,	M.E.,	Tatamy.
Ernest Stanley Miller,	C.E.,	Utica, N.Y.
Theodore Kühne Minsker,	C.E.,	York.
David Brydie Mitchell,	E.M.,	Bethlehem.
Elias Robins Morgan,	M.E.,	Wilkes-Barre.
William Henry Myers,	M.E.,	York.
Archibald Ernest Olpp,	A.C.,	Bethlehem.
Carleton Gage Owen,	E.M.,	Elmira, N.Y.
Elmer Clinton Pearson,	Clas.,	West Bethlehem.
Arthur Peck,	A.C.,	Plainfield, N.J.
Wilbur Hendrickson Peepels,	M.E.,	Lancaster.
John Franklin Pelly,	M.E.,	Philadelphia.
George Lester Phillips,	C.E.,	Scranton.
George Brown Prindle,	M.E.,	Washington, D.C.
Paul Peter Reese,	E.M.,	Harrisburg.
John Routt Reigart,	E.M.,	Washington, D.C.
Stillé Agnew Rentzheimer,	Clas.,	Hellertown.
Ivan Schaick Rice,	M.E.,	Catonsville, Md.
Ray James Garfield Ritter,	M.E.,	Allentown.
Luis Rivadeneira,	A.C.,	Gauyaquil, Ecuador.

	Course.	Residence.
Nathan Bennett Robbinovitz,	E.E.,	Brooklyn, N.Y.
John Dwight Rogers,	C.E.,	Remsenburg, N.Y.
Vicente Saucedo,	C.E.,	Saltillo, Mexico.
Clarence M. Saxman,	M.E.,	Latrobe.
Edward L. Schaun,	M.E.,	Baltimore, Md.
Francis Rauch Schmid,	C.E.,	Bethlehem.
John Anistaki Schultz,	C.E.,	Skillman, N.J.
Edmund Alexander deSchweinitz,	M.E.,	Bethlehem.
Albert Bromer Schwenk,	C.E.,	Schwenksville.
James Winfield Scott,	M.E.,	South Bethlehem.
John Horsen Seaman,	E.E.,	Milwaukee, Wis.
Royer Newton Skillman,	E.E.,	Mount Healthy, O.
Dyer Smith,	M.E.,	Washington, D.C.
David Robert Smith,	M.E.,	Pittsburg.
Thomas K. Smith,	Clas.,	Richland Centre.
William Henry Smith,	E.E.,	West Bethlehem.
Oran Charles Snyder,	M.E.,	Bethlehem.
Raymond John Spooner,	M.E.,	East Aurora, N.Y.
Edward Wiseman Sprague,	M.E.,	Elmira, N.Y.
Charles Meredith Strawn,	E.E.,	Quakertown.
George Rosebery Stull,	Clas.,	Ridley Park.
William Stansbury Sutton,	E.M.,	Pittsburg.
Frank Linn Sweeney,	E.M.,	Rushville, Ill.
John Ledyard Talcott,	E.M.,	Buffalo, N.Y.
William Leake Terry,	E.E.,	Little Rock, Ark.
Russell Elmslie Thomas,	Met.,	Philadelphia.
William Austin Townsend,	M.E.,	Plainfield, N.J.
John Heckewelder Traeger,	C.E.,	Bethlehem.
Henry Roscoe Trumbower,	Clas.,	Passer.
Whitmell P. Tunstall,	C.E.,	Washington, D.C.
George Emanuel Twitmyer,	L.S.,	Bethlehem.
Joseph Clyde Twitmyer,	L.S.,	Bethlehem.
Newell VanBergen,	E.E.,	Carbondale.
John Lewis Van DeMark,	E.E.,	Waterloo, N.Y.
Hugh Gaston VanderVeer,	M.E.,	Somerville, N.J.
Bowdewine Bertrand VanSickle,	L.S.,	Unionville, N.Y.
Joseph Benjamin Varela,	E.E.,	Santiago, Cuba.
Frederick Dana Viehe,	Clas.,	Atlanta, Ga.
Marcus Acheson Walker,	M.E.,	Washington, D.C.

	Course.	Residence.
Henry R. Walters,	C.E.,	Oceanside, Cal.
George J. Walz,	E.E.,	Harrisburg.
James Stewart Warr,	E.E.,	Oneida, N.Y.
William Lentz Weiss,	C.E.,	Bethlehem.
Emery Stone Whitney, jr.,	E.M.,	Allentown.
Newton A. Wolcott,	E.E.,	Farmington, O.
Arthur William Wright,	E.E.,	Somers, N.Y.
Ray Franklin Wunderly,	C.E.,	Nazareth.
Charles Henry Young,	C.E.,	Bethlehem.

SPECIAL STUDENTS.

	Course.	Residence.
David Maurice Barry,	E.M.,	Agawam, Mass.
John A. Blank,	A.C.,	Schadt's.
Henry James Corfield,	C.E.,	New York, N.Y.
Thomas Bernard Dornin,	M.E.,	Bethlehem.
Enoch Walter Earle,	C.E.,	Ithaca, N.Y.
Vernon James Hall, Ph.D.,	C.E.,	Rockford, Ill.
Webster Thomas James,	E.M.,	Chattanooga, Tenn.
Joseph Allison Steinmetz,	E.M.,	Philadelphia.

SUMMARY OF STUDENTS BY STATES.

Maine,	1
Massachusetts,	5
Connecticut,	2
Rhode Island,	1
New York,	45
New Jersey,	32
Pennsylvania,	226
Delaware,	2
Maryland,	17
District of Columbia,	13
Virginia,	4
West Virginia,	3
North Carolina,	2
South Carolina,	1
Georgia,	1
Florida,	2
Kentucky,	3
Tennessee,	5
Arkansas,	1
Missouri,	1
Texas,	1
Ohio,	2
Indiana,	3
Illinois,	5
Michigan,	2
Wisconsin,	2
Iowa,	1
Kansas,	1
South Dakota,	1

Colorado,	1
Utah,	1
Montana,	1
California,	2
Indian Territory,	1
Mexico,	8
Cuba,	5
Jamaica,	1
Nicaragua,	1
Brazil,	1
Ecuador,	2
Peru,	1
France,	2
Armenia,	1
Japan,	1
China,	1
	415

SUMMARY OF STUDENTS BY CLASSES AND COURSES.

	Graduates.	Seniors.	Juniors.	Sophomores.	Freshmen.	Specials.	Totals.
Classical,	4	1	2	1	14	—	22
Latin-Scientific,	—	1	—	—	4	—	5
Science and Letters,	—	2	—	1	—	—	3
Civil Engineering,	6	22	19	22	42	3	114
Mechanical Eng.,	5	17	25	16	56	1	120
Mining Eng.,	1	12	9	12	12	3	49
Metallurgy,	—	—	1	—	1	—	2
Electrical Eng.,	1	8	16	15	33	—	73
Analytical Chem.,	—	4	7	5	8	1	25
Architecture,	—	2	—	—	—	—	2
Totals,	17	69	79	72	170	8	415

ALUMNI

OF THE

LEHIGH UNIVERSITY.

CLASS OF 1869.

*J. Haynes Hinds Corbin, A.C.

Miles Rock, C.E., Astronomer, Chief Eng'r, and Pres. of the Boundary Commission of Guatemala with Mexico, Guatemala City, Central America.

Charles Edward Ronaldson, M.E., Mechanical Eng'r, 4017 Locust St., Philadelphia, Pa.

CLASS OF 1870.

*Lehman Preston Ashmead, A.C., M.D.

Richard Brodhead, M.E., Attorney-at-Law, 32 Nassau St., New York, N.Y.

William R. Butler, M.E., Manufacturer, Mauch Chunk, Pa.

George A. Jenkins, A.C., South Bethlehem, Pa.

William J. Kerr, A.C., M.E., Res. 1010 S. 49th St., Philadelphia, Pa.

*Harry E. Packer, A.C.

Henry R. Price, C.E., M.D., Practicing Physician, 485 Franklin Ave., Brooklyn, N.Y.

Henry B. Reed, B.A., M.D., Physician (retired), Milford, Pike Co., Pa.

*William Dunlop Ronaldson, B.A., M.D.

John M. Thome, C.E., Ph.D., Foreign Associate, R. A. S., Director National Astronomical Observatory, Cordova, Argentine Republic, S.A.

*Russel B. Yates, C.E.

*Deceased.

CLASS OF 1871.

Jacob Neff Barr, M.E., Mechanical Supt. B. & O. Ry. Res: Baltimore, Md.

Frank Laurent Clerc, C.E., Mining, Philipsburg, Pa.

Henry S. Drinker, E.M., Lawyer; General Solicitor of the L. V. R. R. Co., 26 Cortlandt St., New York, N.Y. Vice-President East Jersey Water Co., 2 Wall St., New York, N.Y. Res. and mailing address: Haverford, Pa.

Edward F. Fassitt, A.C., 153 E. Washington Lane, Germantown Pa.

William Hull MacCarthy, B.A., Sec. of the White Mfg. Co., Globe Iron Works, 556 W. 34th St., New York, N.Y.

Waldron Shapleigh, A.C., Chemist, Welsbach Light Co., Gloucester City, N.J. Res: 2223 Delancey St., Philadelphia, Pa.

*Charles G. Weaver, C.E.

CLASS OF 1872.

George Pierrepont Bland, C.E., Pres. of the Keystone Structural Co., 510 Harrison Bldg., Philadelphia, Pa. Res: 3220 Woodland Ave.

Daniel P. Bruner, C.E., Civil Eng'r, Architect, and Builder, 501 W. Chelten Ave., Germantown, Philadelphia, Pa.

Henry St. Leger Coppée, C.E., U.S. Asst. Eng'r in charge of U.S. Levees in Mississippi. Res: Greenville, Miss.

*F. R. Christian Degenhart, A.C.

Harvey S. Houskeeper, B.A., Prin. of State Academy, Brookeville, Md.

*Lentz Edmund Klotz, C.E.

Oscar Moore Lance, A.C., Gen. Mgr., Spring Brook Water Supply Co., Plymouth, Pa.

Raymundo Floresta de Miranda, M.E., Division Eng'r, Rio de Janeiro and Northern R.R. Address: E. F. Principe de Grao Pará, Estaçaodo Areal, Rio de Janeiro, Brazil.

James S. Polhemus, C.E., Asst. U. S. Eng'r, in local charge Coos Bay Harbor Improvements, Empire, Ore.

Henry Darcy Scudder, C.E., Lumber and Coal, 344 Perry St., Trenton, N.J.

CLASS OF 1873.

Washington Hopkins Baker, A.C., M.D., Physician and Life Insurance Examiner, 1610 Summer St., Philadelphia, Pa.

Robert B. Claxton, C.E., Fourth St. National Bank, Philadelphia, Pa. Res: 5116 Newhall St., Germantown, Pa.

James Peyton Stuart Lawrance, M.E., Lieutenant Commander U. S. Navy. Res: Philadelphia. Permanent address: care of Navy Department, Washington, D.C.

Hildebrando Barjona de Miranda, A.C., Prof. of English, Lyceo Paraence, Belém do Pará, Estades Unidos do Brazil.

Wallace McIlvaine Scudder, M.E., Publisher Newark *Evening News*. Res: 10 Washington Pl., Newark, N.J.

CLASS OF 1874.

Caspar Wistar Haines, A.M. (Haverford '72), C.E., of the firm of Silva y Haines, Eng'rs and Contractors, Puebla, Mexico.

William Davis Hartshorne, C.E., Agt. Arlington Mills, Lawrence and Methuen, Mass. Res: 40 Pleasant St., Methuen, Mass.

Allen A. Herr, C.E., Civil Eng'r and Real Estate Agt., 108 E. King St., Lancaster, Pa.

Thomas Merritt, C.E., Mgr. Mutual Life Insurance Co. of New York, 31-32-33 Canadian Bank of Commerce Bldg., Toronto, Can.

William Marshall Rees, C.E., First Asst. Eng'r, Mississippi River Improvement, Appeal Bldg., Memphis, Tenn.

CLASS OF 1875.

Charles Julius Bechdolt, C.E., Supt. Central Division P., W. & B. R. R., Media, Pa.

Antonio M. Cañadas, A.C., Chemist, Loja, Ecuador.

John F. Halbach, B.A., B.M., Attorney-at-Law, 1218-1220 Filbert St., Philadelphia, Pa.

William Arthur Lathrop, C.E., Gen. Supt. of the Lehigh Valley Coal Co., Wilkes-Barre, Pa.

Arthur E. Meaker, C.E., Asst. Prof. of Mathematics, Lehigh University. Res: 542 North St., Bethlehem, Pa.

Joseph Morrison, C.E., Resident Eng'r for Lines west of the Mississippi River, The Wabash Railroad Co. Res: 401 S. Clark St., Moberly, Mo.

Francis Sebastian Pecke, C.E., Sec. The Nebraska, Kansas & Gulf Railway Co. Res: 4915 Cedar Ave., Philadelphia, Pa.

Edward H. Williams, jr., B.A. (Yale), A.C., E.M. ('76), F.G.S.A., Prof. of Mining and Geology, Lehigh University. Res: Twelfth Ave., Hanover, Lehigh Co., Pa. P.O. address: Bethlehem, Pa.

*Carl F. Zogbaum, C.E.

CLASS OF 1876.

Frank C. Angle, C.E., Attorney-at-Law, Danville, Montour Co., Pa.

*James DeWitt Carson, C.E.

*Thomas William Frederick, M.E.

William Griffith, C.E., Mining Eng'r and Coal Specialist, Coal Exchange, Scranton, Pa. Res: 405 Susquehanna Ave., West Pittston, Pa.

C. William Macfarlane, C.E., Ph.D.,(Freiburg i. B. '93). Narberth, Pa.

Robert W. Mahon, C.E., Ph.D. (Johns Hopkins), Prof. of Chemistry and Geology, Central High School, Pittsburg, Pa. Res: 1778 Second Ave.

J. J. deGama Malcher, M.E., Naval Officer, Customs House, Para, Brazil.

Walter Percival Rice, C.E., Civil Eng'r, The Walter P. Rice Engineering Co., 545 Society for Savings Bldg., Cleveland, O. Res: 293 Euclid Ave.

Henry Richards, E.M., Contractor, Dover, N.J.

Lowdon W. Richards, M.E., Lukens Iron and Steel Co., Coatesville, Pa. Mailing address: P.O. Box 310.

Charles L. Taylor, E.M., Asst. to Pres. The Carnegie Co., Ltd., Carnegie Bldg., Pittsburg, Pa.

CLASS OF 1877.

John Eagley, C.E., North Springfield, Erie Co., Pa.

Percival D. Giess, C.E., Bethlehem, Pa.

*Andrew M. Glassel, C.E.

George M. Heller, C.E., Bridge Eng'r, 853 N. 20th St., Philadelphia, Pa.

Henry Sylvester Jacoby, C.E., Associate Prof. of Bridge Engineering and Graphics, Cornell University. Res: 7 Reservoir Ave., Ithaca, N.Y.

James Fremont Marsteller, C.E., Supt. Snow Shoe Division, Lehigh Valley Coal Co., Snow Shoe, Centre Co., Pa.

*Seizo Miyahara, C.E.

Charles R. Rauch, A.C., Chemist, Lehigh Portland Cement Co., Egypt, Pa. Res: Bethlehem, Pa.

Lewis Theodore Wolle, C.E., Sec. of the Cambria Mining Co., Cambria, Weston Co., Wyoming.

CLASS OF 1878.

Charles Bull, M.E., Asst. Librarian and Bursar, General Theological Seminary, Chelsea Sq., New York, N.Y.

*James E. Gilbert, C.E.

William Convers Hazlett, M.E., Architect, 1133 Broadway, New York, N.Y.

Frank Perley Howe, B.A. (Brown), E.M., Pres. The North Branch Steel Co.; Vice Pres. Wm. Wharton, jr., & Co., Inc. Res: 251 S. 17th St., Philadelphia, Pa.

Nathaniel Lafon, M.E., Eng'r for Whitley Coal Co., Halsey, Whitley Co., Ky.

Benjamin B. Nostrand, jr., M.E., Electrical Eng'r, Treas. and Mgr. The Sing Sing Electric Lighting Co.; Pres. and Treas. The Peekskill Electric Light and Power Co., Peekskill, N.Y.

Milnor Peck Paret, C.E., Chief Eng'r Kansas City Sub Belt R. R., K. C. & N. C. R. R. 616 Wyandotte St., Kansas City, Mo. Res: 608 W. 17th St.

Holbrook Fitz John Porter, M.E., Sales Agt., Bethlehem Steel Co., South Bethlehem, Pa.

William K. Randolph, C.E.

Robert H. Read, B.A., Counsel and Expert in Patent Cases, 44 Broad St., New York, N.Y. Res: East Orange, N.J.

Henry Church Wilson, C.E., U. S. Asst. Eng'r and Chief Clerk, U. S. Eng'r Office, Room C 8, Army Bldg., New York, N.Y.

CLASS OF 1879.

James S. Cunningham, M.E., Supt. and Chief Eng'r, Berwind-White Coal Mining Co., Windber, Somerset Co., Pa. Res: Tyrone, Pa.

*Joseph Hill Paddock, M.E.

Fitz William Sargent, C.E., Chief Eng'r, The Sargent Co., Managing Eng'r American Brake Shoe Co., 675 Old Colony Bldg., Chicago, Ill. Res: Wilmett, Ill. (P.O. Box 273.)

Richard Hawley Tucker, C.E., Astronomer, Lick Observatory, Mt. Hamilton, Cal.

CLASS OF 1880.

Abraham Bruner, E.M., Civil Eng'r, Asst. Eng'r, Norfolk & Western R. R., Crewe, Nottoway Co., Va.

Murray Morris Duncan, A.C., E.M. ('80), Agt. Cleveland-Cliffs Iron Co., Ishpeming, Mich.

Thomas Hughlett Hardcastle, B.A., M.A. ('82), LL.B., Attorney-at-Law, 601 Boston Bldg., Denver, Col. Res: 950 Pearl St.

John Tinsley Jeter, E.M., Supt. of the Keystone Coal Co., Wilkes-Barre, Pa. Res: 449 S. River St.

Charles Francis King, A.C.

George Ernest Potter, C.E., Asst. Eng'r, New York, Chicago & St. Louis R. R., 151 Wayne St., Fort Wayne, Ind.

Frederick Putnam Spalding, C.E., Contracting Eng'r, 126 S. New St., Bethlehem, Pa.

Leonard Blakeslee Treharne, B.A., Editorial Dept. *New York Times*, New York, N.Y.

Benjamin Russell Van Kirk, M.E., Locomotive Designer, Baldwin Locomotive Works, 2105 Green St., Philadelphia, Pa.

Frederick Copeland Wooten, M.E.

CLASS OF 1881.

William Simon Cranz, A.C., Purchasing and Development of Mining Property, Nogales, Arizona.

Alexander Patrick Crilly, B.A., Allentown, Pa.

Thomas Morgan Eynon, M.E., Gen. Mgr. The Eynon-Evans Mfg. Co., 15th and Clearfield Sts., Philadelphia, Pa. Res: 3119 N. 16th St.

Charles Weed Gray, A.C., with Central of Georgia Ry., Chicago, Ill.

Benjamin Franklin Haldeman, E.M., Supt. Bessemer Dept. Cambria Steel Co., Johnstown, Pa. Res: Fayette St., Westmont, Johnstown.

Lewis Stockton, B.A., Counselor-at-Law, Erie Bank Bldg., Cor. Niagara and Main Sts., Buffalo, N.Y. Res: Cor. North and Franklin Streets.

CLASS OF 1882.

Louis Oscar Emmerich, E.M., Mining Eng'r, Hazleton, Pa.

Charles Comstock Hopkins, B.S. (Sci.), C.E. ('84), member of firm of The Stanwix Engineering Co., Hydraulic and Sanitary Eng'rs, Rome, N.Y.

Elmer Henry Lawall, C.E., Vice Pres. Colliery Engineering Co., Scranton, Pa., Mining and Consulting Eng'r. Res: 267 S. Franklin St., Wilkes-Barre, Pa.

Robert Thomas Morrow, C.E., Asst. Eng'r, Pittsburg Division, Penn. R. R. Mailing address: Room 5, Union Station, Pittsburg, Pa.

Eugene Ricksecker, C.E., Civil Eng'r, U. S. Asst. Eng'r in local charge of fortification work, Marrowstone Point, Seattle, Wash.

John Dougherty Ruff, E.M., 328 S. 21st St., Philadelphia, Pa.

*Samuel Brenton Sickler, C.E.

Martin Wittmer, E.M., Supt. Wittmer Brick Co., Ltd., Glen Shaw, Allegheny Co., Pa.

CLASS OF 1883.

*Enos Kellar Bachman, E.M.

Walter Briggs, B.A., Attorney-at-Law, Board of Trade Bldg., Scranton, Pa. Res: 1505 Adams Ave.

Henry Augustus Butler, B.S. (Sci.), Sec. and Treas. Carbon Iron and Steel Co., Ltd., Mauch Chunk, Pa.

Hedley Vicars Cooke, B.A., LL.M. (Columbian Univ.), Attorney-at-Law, 150 Nassau St., New York, N.Y. Res: 293 Park Ave., Orange, N.J.

Francis Joseph Crilly, B.A., M.A. ('89), Special Deputy Collector of the Port, Custom House, Philadelphia, Pa. Res: Souderton, Pa.

Francis Wharton Dalrymple, C.E., City Eng'r, 131 Main St., Hornellsville, N.Y.

Timothy James Donahue, A.C.

George Francis Duck, E.M., Wholesale Coal Dealer, Room 9, 1 Broadway, New York, N.Y. Res: 41 Madison St., Brooklyn, N.Y.

Alfred Edmond Forstall, M.E., Sec. and Treas., American Gas Light Association; Sec. of Trustees for Gas Educational Fund; Consulting Gas Eng'r. 58 William St., New York, N.Y. Res: 60 Christopher St., Montclair, N.J.

Nathaniel Oliver Goldsmith, M.E., Vice Pres., the Wefugo Co.; Treas. the American Coke Drawer Co., Cincinnati, O. Res: Glendale, Hamilton Co., O.

William Theodore Goodnow, C.E., Gen. Mgr. Cayuta Wheel and Foundry Co., and The Sayre Land and Water Co., Sayre, Pa.

John Daniel Hoffman, B.A, M.A. ('89), Counselor-at-Law, 17 Broad St., Bethlehem, Pa. Res: 30 N. Main St.

George Gowen Hood, C.E., Civil Eng'r, Mount Airy, Philadelphia, Pa.

Garrett Linderman Hoppes, C.E., Eagle Hotel, Bethlehem, Pa.

Julian de Bruyn Kops, B.E. (Univ. of Ga.), C.E., Asst. City Eng'r, Savannah, Ga.

Preston Albert Lambert, B.A., M.A. ('91), Asst. Prof. of Mathematics, Lehigh University, South Bethlehem, Pa. Res: 215 Centre St., Bethlehem, Pa.

Edwin Francis Miller, with R. D. Wood & Co., Camden, N.J.

Rev. Wilson Franklin More, B.A., M.A. ('91), Pastor Salem Reformed Church, Editor "Consistory" department in "Reformed Church Messenger," Teacher of German in Allentown College for Women. Res: Catasauqua, Pa.

Nelson Morrow, M.E., Mgr. of the Deep Rock Mineral Springs, Oswego, N.Y. Res: 235 W. 1st St.

Thomas Nicholson, M.E., with the Johnstown R.R. Frog and Switch Co., Chester, Pa.

George Spencer Patterson, E.M., Mining and Civil Eng'r, 400 Opera House Bldg., Terre Haute, Ind.

Rembrandt Richard Peale, B.S. (Sci.), Sec. and Treas., Bloomington Mining Co., 411-413 Walnut St., Philadelphia, Pa.

Henry Allebach Porterfield, E.M., Pres. and Gen. Mgr., The Dexter Spring and Gear Co., Pittsburg, Pa. Res: 5232 Westminster St., E.E.

Francis Henry Purnell, C.E., E.M. ('86), Clerk of the Circuit Court, Worcester Co., Snow Hill, Md.

Jesse Wilford Reno, E.M., Rapid Transit Tunnel for New York City: The Reno Inclined Elevator Co.; Mining Expert, 141 Broadway, New York, N.Y. Res: 8 W. 38th St.

Charles Loomis Rogers, M.E., District Mgr. American Car and Foundry Co., Milton, Pa.

John Ruddle, M.E., Gen. Supervisor, Canal Dept., The Lehigh Coal and Navigation Co., Mauch Chunk, Pa.

Charles Henry Stinson, B.S. (Sci.), Attorney-at-Law, 317 Swede St., Norristown, Pa. Res: 319 Swede St.

*Robert Stinson, B.S. (Sci.).

CLASS OF 1884.

Robert Grier Cooke, B.A., Journalist, with D. Appleton & Co., 72 Fifth Avenue, New York, N.Y. Res: 43 W. 35th St.

Henry Bowman Douglas, B.M., E.M. ('85), Chief Eng'r, Vinton Colliery Co., Vintondale, Cambria Co., Pa.

William Banks Foote, B.M., E.M. ('86), Etiwanda, San Bernardino Co., Cal.

Harry Tallman Harper, C.E., Asst. Eng'r, Florence & Cripple Creek R. R., Florence, Col.

Harry Hurd Hillegas, C.E., Sec. and Mgr., Hercules Paper Bag Co., Reading, Pa.

Edwin Franklin Hofford, C.E., Lehighton, Pa.

John Andrew Jardine, B.M., E.M. ('85), with Pilling & Crane, Girard Bldg., Philadelphia, Pa. Mailing address: Kenvil, Morris Co., N.J.

James Warner Kellogg, M.E., Mgr. of Marine Sales, General Electric Co., Schenectady, N.Y. Res: 10 Front St.

David Garrett Kerr, B.M., Supt. of Blast Furnace, Edgar Thomson Works, Carnegie Steel Co., Ltd., Braddock, Pa. Res: 17 Kirkpatrick Ave.

Frederick Bowman Langston, C.E., Architect, 1239 Bedford Ave., Brooklyn, N.Y.

William Langston, C.E., with Dean & Westbrook, Bridge Eng'rs and Contractors, 136 Liberty St., New York, N.Y.

Robert Packer Linderman, Ph.B., Pres. of The Bethlehem Steel Co.; Pres. of The Bethlehem Iron Co.; Pres. of the Lehigh Valley National Bank. Res: South Bethlehem, Pa.

Joseph Franklin Merkle, C.E., M.D. (Univ. of Pa. '94), Boyertown, Pa.

Harry Krider Myers, C.E., with Baldwin Locomotive Works, Philadelphia, Pa. Res: 3653 N. 15th St.

Albino Rosendo Nuncio, M.E., Chief of the Patent Office, Dept. of Public Promotion (Secretaria de Fomento), City of Mexico, Mexico.

James Ward Packard, M.E., Pres. The Packard Electric Co., Manufacturers, Warren, O.

Alfred Scull Reeves, B.M., E.M. ('85), of the firm of Paul S. Reeves & Son, Manufacturers of Phosphor Bronze, Brass, Babbitt Metals, etc., 1415-1425 Catharine St., Philadelphia, Pa. Res: 21st St. and Delancey Pl.

Barry Searle, A.C., 150-152 North St., New York, N.Y. Res. 138 Reap St., Brooklyn, N.Y. Permanent address: Montrose, Pa.

Lewis Buckley Semple, B.A., M.A. ('91), Ph.D. (Princeton), Teacher of English, High School, Brooklyn, N.Y. Permanent address: Bethlehem, Pa.

Augustus Parker Smith, M.E., LL.B. (Georgetown Univ.), Counsel in Patent Cases, 45 Broadway, New York, N.Y. Res: Hotel Lincoln, 52d St. and Broadway.

Murray Stewart, M.E., Motive Power Dept., Philadelphia, Wilmington & Baltimore R.R.Co., Wilmington, Del.

Richard Washington Walker, C.E., Glen Moore, Pa.

James Angus Watson, C.E., Patent Lawyer, 931 F St., N.W., Washington, D.C. Res: 1454 Howard Ave.

CLASS OF 1885.

Warren Howard Allen, A.C., Clerk, Farmers' National Bank, Athens, Pa.

Harrison Link Auchmuty, C.E., Chief Draftsman, Pittsburg Coke Co., 232 Fifth Ave., Pittsburg, Pa. Permanent address: Millersburgh.

*Theodore Weld Birney, C.E.

Harry Luther Bowman, B.M., care of Y. M. C. A., Harrisburg, Pa.

William Harvey Cooke, B.A., M.D., 10 N. Munn Ave., East Orange, N.J.

William Noble Edson, C.E., of the firm of Edson Brothers, Gen. Contractors, Phelps, N.Y.

*John Roberts Engelbert, C.E.

Felix Freyhold, C.E., Draftsman, Bureau of Yards and Docks, Navy Dept., Washington, D.C. Res: 236 1st St., S.E.

Irving Andrew Heikes, B.M., E.M. ('86), Supt. of Schools, Plymouth, Pa.

David Kirk Nicholson, M.E., with the Carnegie Steel Co., Ltd., Braddock, Pa.

*Fayette Brown Petersen, C.E.

John Bertsch Price, C.E., Cashier, First National Bank, Hazleton, Pa.

Harry William Rowley, M.E., Asst. Supt., The Dickson Mfg. Co., Scranton, Pa. Res: 923 Vine St.

*Elliot Otis Smith, C.E.

Clarence Moncure Tolman, M.E., Mechanical and Electrical Eng'r, with Edward G. Stoiber, Silver Lake Mines, Silverton, Col.

*John R. Wagner, M.E.

James Hollis Wells, C.E., Civil Eng'r, with Clinton & Russel, Architects, 32 Nassau St., New York, N.Y.

Cabell Whitehead, B.M., M.S. (Columbian Univ.), Assayer to the Bureau of the Mint, Treasury Dept., Washington, D.C. Res: 1147 New Hampshire Ave.

CLASS OF 1886.

George Rodney Booth, Ph.B., Attorney-at-Law, Cor. Brodhead Ave and 4th St., S. Bethlehem, Pa. Res: 410 Market St., Bethlehem, Pa.

Richard Singmaster Breinig, B.S., E.M. ('89), Eng'r Dept., Kansas Div., Union Pacific Ry., 12th and Liberty Sts., Kansas City, Mo. Res: 1600 Park Ave.

John Henry Brown, C.E., Asst. Eng'r, Sewerage Dept., Room 207, City Hall, Chicago, Ill. Res: 1499 Washington Boul.

Charles Ellsworth Clapp, Ph.B., Attorney-at-Law, 803-804 New York Life Bldg., Omaha, Neb.

George Henry Cobb, M.E., Chief Eng'r, New York Transit Co. Res: 79 Prospect St., Passaic, N.J.

William Henry Dean, B.M., E.M. ('86), A.C. ('86), Chemist and Biologist, Spring Brook Water Supply Co. Res: 167 West River St., Wilkes-Barre, Pa.

Frederick William Fink, C.E., of the firm of Gibson & Fink, Civil and Mining Eng'rs, U. S. Deputy Mineral Surveyors, 303 Carr Ave., Cripple Creek, Col.

Robert Caldwell Gotwald, C.E., Architect, Springfield, O.

Lewis John Henry Grossart, C.E., Civil Eng'r, with the Atlas Cement Co., Northampton, Pa. Res: 513 Allen St., Allentown.

Max S. Hanauer, A.C., Mgr. Union Assay Office, 152 S.W. Temple St., Salt Lake City, Utah. Res: 1111 E. First South St.

Solomon Jacob Harwi, C.E., Civil Eng'r, The Babcock & Wilcox Co., New York, N.Y. Res: 910 Ave. C, Bayonne, N.J.

Simeon Cole Hazelton, B.M., E.M. ('87), Asst. Supt., Germania Lead Works, Murray, Utah.

Mark Antony DeWolfe Howe, B.A., A.B. and A.M. (Harvard), Associate Editor of *The Youths' Companion*, Boston, Mass. Permanent address, Bristol, R.I.

Charles Alexander Junken, C.E., Computer Ordnance Dept., U. S. Army, Washington, D.C. Res: 435 New Jersey Ave., S.E.

Guadalupe Lopez de Lara, M.E., of the firm of Mora y Lopez de Lara, Constructores y Contratistas, Calle de Sn. Francisco, No 17½, Guadalajara, Jalisco, Mexico.

Charles Augustus Luckenbach, B.M., Purchasing Agt. for The Los Angeles Lighting Co. and the Los Angeles Electric Co., 457 Broadway, Los Angeles, Cal. Res: 1443 Carroll Ave.

William Anthony Lydon, B.M., E.M. ('87), Pres. Lydon & Drews Co., Eng'rs and Contractors, 1441 Unity Bldg., 79 Dearborn St., Chicago, Ill. Res: 2952 Indiana Ave.

Paul Douglass Millholland, C.E., with American Iron and Steel Mfg. Co., Reading, Pa. Res: 415 Spring St.

Henry Gerber Reist, M.E., Mechanical and Electrical Eng'r, with General Electric Co., Schenectady, N.Y. Res: 5 S. Church St.

Joseph William Richards, A.C., M.S. ('91), Ph.D. ('93), Asst. Prof. of Metallurgy, Lehigh University. Res: American Hotel, Bethlehem, Pa.

George Mann Richardson, A.C., Ph.D. (Johns Hopkins), Prof. of Organic Chemistry, Leland Stanford, jr. Univ., Stanford University, Cal.

*Augustus Stoughton Ross, M.E.

*George Arthur Ruddle, Ph.B.

William Heysham Sayre, jr., M.E., Mgr. International Contracting Co. Res: Glen Ridge, N.J. Permanent address: South Bethlehem, Pa.

John Selmar Siebert, C.E., Architect, Cumberland, Md. Res: 127 Washington St.

John Henry Spengler, C.E., Asst. City Eng'r, Room 325 City Hall, Chicago, Ill. Res: 8 Crilly Pl.

Edwin Stanton Stackhouse, B.M., E.M. ('87), General Business, Shickshinny, Pa.

Theodore Stevens, B.M., E.M. ('87), Electrical Eng'r, British Thomson-Houston Co., Ltd., 83 Cannon St., London.

Harry Eugene Stout, B.S. (in Mining and Metallurgy), Audenried, Pa.

*Joseph Kiddoo Surls, B.M.

Rev. William Patterson Taylor, B.A., Asst. Minister, St. Peter's Church, Morristown, N.J. Res: 11 DeHart St.

Harry Toulmin, Ph.B., M.D., Asst. Medical Director, Penn Mutual Life Insurance Co., Philadelphia, Pa. Permanent address: 925 Chestnut St.

Priestly Toulmin, B.M., E.M. ('87), Chief Eng'r, Sloss Iron and Steel Co., Birmingham, Ala.

Curtis Hussey Veeder, M.E., Pres. Veeder Mfg. Co., Hartford, Conn. Res: 40 Willard St.

CLASS OF 1887.

Frank Fielding Amsden, B.S., E.M. ('89), Supt. Buena Vista Furnace, Buena Vista, Md.

Robert Webb Barrell, B.M., E.M. ('88), Asst. Mgr. and Mining Eng'r, St. Louis Sampling and Testing Works, 1225-1227 Spruce St., St. Louis, Mo.

Alexander Bonnot, C.E., Poole St., Norfolk, Va.

Charles Austin Buck, A.C., Chief Chemist, Bethlehem Steel Co., S. Bethlehem, Pa. Res: 521 Locust St.

Julian Carter Buckner, M.E., 1009 McCulloch St., Baltimore, Md.

Benjamin Amos Cunningham, C.E., Div. Eng'r, L.V.R.R., Sayre, Pa.

Eugene Diven, M.E., of the firm of Diven & Diven, Attorneys and Counsellors-at-Law, 212 E. Water St., Elmira, N.Y. Res: 957 Lake St.

Alfred Doolittle, B.A., Director of the Observatory and Instructor in Mathematics in the Catholic Univ., Washington, D.C. Res: 48 M St., N.W.

Francis Rouad Dravo, M.E., of F. R. Dravo & Co., Eng'rs and Contractors, 812 Lewis Blk., Pittsburg, Pa. Res: Edgeworth, Sewickley P.O., Pa.

Milton Henry Fehnel, B.S. (Sci.), A.C. ('89), Asst. Chemist at the Spreckels Refinery of the American Sugar Refining Co., Philadelphia, Pa. Res: 265 S. 9th St.

Rev. Harvey Sheafe Fisher, B.A., B.D. (General Theological Seminary), Rector of St. John's Parish, Norristown, Pa.

Kenneth Frazier, B.A., Artist, 41 Washington Sq., New York, N.Y. Res: 58 E. 78th St.

*Henry Stevens Haines, M.E.

John Benjamin Hittell, C.E., Asst. Eng'r, Bureau of Streets, 217 City Hall, Chicago, Ill. Res: 1746 Wrightwood Ave.

John Myers Howard, M.E., Forge Supt., Latrobe Steel Co., Latrobe, Pa.

Charles Colcock Jones, B.S. (in Mining and Metallurgy), Consulting Eng'r to Edward N. Breitung, Marquette, Mich.

William Frederick Kiesel, jr., M.E., Chief Draftsman, P.R.R., Altoona, Pa. Res: 2320 Broad St.

James Wesson Kittrell, C.E., of the Stanwix Engineering Co., Hydraulic and Sanitary Eng'rs, Rome, N.Y.

Frederick Hayes Knorr, A.C. Permanent address: 144 School House Lane, Germantown, Pa.

*Samuel Davis Langdon, M.E.

John Walter Ledoux, C.E., M. Am. Soc. C.E., Chief Eng'r, The American Pipe Mfg. Co., 112 N. Broad St., Philadelphia, Pa. Res: Swarthmore, Pa.

Garrett Brodhead Linderman, Ph.B., Coal Operator, S. Bethlehem, Pa.

Harry Smuller Meily, C.E., Asst. Supervisor, P.R.R., Spruce Creek, Pa.

James Alexander Morrow, C.E., Hydraulic Eng'r, American Water Works and Guarantee Co., Ltd., Lewis Blk., Pittsburg, Pa.

Henry Benjamin Charles Nitze, B.S., E.M. ('88), Consulting Mining Eng'r, care of Robt. Garrett & Sons, 11 South St., Baltimore, Md. Res: Roland Park, Baltimore, Md.

George Francis Pettinos, M.E., of the firm of Pettinos Bros., Miners of Graphite, L. V. National Bank Bldg., Bethlehem, Pa.

Robert Henry Phillips, C.E., Mgr., Washington, Arlington & Falls Church Ry. Co., Alexandria Co., Va. Res: 3342 M St., Washington, D.C.

Rufus King Polk, B.S., E.M. ('88), Member of Congress; Gen. Mgr., Danville Bessemer Steel Co., member of firm of Howe & Polk, Danville, Pa. Res: 6 Walnut St.

Charles Pope Pollak, C.E., Traveling Salesman, Fairbanks, Morse & Co., Chicago, Ill. Permanent address: 1129 N. Grand Ave., St. Louis, Mo.

Mason Delano Pratt, C.E., Street Railway Eng'r, with the Pennsylvania Steel Co., Steelton, Pa.

Evan Turner Reisler, C.E., Trainmaster Erie R.R., Erie Depot, Port Jervis, N.Y. Res: 50 E. Main St.

George Thomas Richards, C.E., Eng'r for Drake and Stratton Co., Conestoga Bldg., Pittsburg, Pa. Res: 5815 Hays St.

*John Warwick Scull, M.E.

Frank Stuart Smith, A.C., Mgr. Sawyer-Man Electric Co., Allegheny, Pa.

Elmer Ellis Snyder, C.E., Roadmaster, Louisville, Cincinnati & Lexington Div. Louisville & Nashville R.R., LaGrange. Ky.

Harry Harkness Stoek, B.S., E.M. ('88), Editor *Mines and Minerals*, Scranton, Pa. Res: 809 Quincy Ave.

*Otway Owen Terrell, M.E.

Edward Power Van Kirk, B.M., Electrical Eng'r, Elizabeth, Pa.

August Julius Wiechardt, M.E., Prof. of Mechanic Arts, Agricultural College, Miss.

Henry August Julius Wilkens, B.S., E.M. ('88), Mining Eng'r, 71 Broadway, New York, N.Y.

Frank Williams, B.S., E.M. ('88), Mgr. Basic Brick Co., and Fayette Mfg. Co., Pittsburg, Pa. Res: 511 Main St., Johnstown, Pa.

Nissley Joseph Witmer, C.E., Draftsman, Dept. of Public Works, Philadelphia, Pa. Address: 4534 Frankford Ave., Philadelphia.

*Hampton Woods, B.S. (Sci.), B.M. ('88), E.M. ('89).

George Frederick Yost, M.E., L. V. Coal Co., Wilkes-Barre, Pa.

Charles F. Zimmele, Ph.B., Principal Bradley School, 205 9th St., S.W., Washington, D.C.

CLASS OF 1888.

Charles Lambert Addison, M.E., Gen. Roadmaster, Long Island R.R. Res: Hempstead, N.Y.

George Reade Baldwin, M.E., Asst. Examiner, U. S. Patent Office, Washington, D.C.

Charles Lincoln Banks, B.S. (Sci.), M.D., Physician and Surgeon, 254 State St., Bridgeport, Conn.

Edmund A. Bates, C.E., Draftsman, King Bridge Co., Cleveland, O. Res: 231 Kennard St.

William Donaldson Beatty, C.E., Asst. Eng'r, P. & R.R.R. Address: Chief Eng'r's Office, Reading Terminal, Philadelphia, Pa.

Hubert Alexander Bonzano, C.E., Civil Eng'r, 331 S. 18th St., Philadelphia, Pa.

William Bradford, C.E., Civil Eng'r, 75 Fidelity Bldg., Pittsburg, Pa. Res: 142 S. Negley Ave.

Adolph Theodore Bruegel, M.E., M.M.E. (Cornell '96), Prof. of Machine Design and Mechanics, Pratt Institute, Brooklyn, N.Y. Res: 201 Greene Ave.

Otto Cornelius Burkhart, B.S., E.M. ('89), C.E. ('92), Supt. Blast Furnace Dept. The Pennsylvania Steel Co., Steelton, Pa.

Charles Noble Butler, C.E., Attorney-at-Law, Patent, Trade-Mark, and Copyright Cases, 1001 Chestnut St., Philadelphia, Pa.

Morton Lewis Byers, C.E., Eng'r, Maintenance of Way Dept., Chicago Div. P.C.C. & St. L.R.R., Logansport, Ind.

John Jesse Clark, M.E., Asst. Mgr., The International Correspondence Schools, P.O. Box 534, Scranton, Pa. Res: 1210 Mulberry St.

George Philip Connard, C.E., Eng'r in charge of drafting, with Elmira Bridge Co., Ltd., Box 63, Elmira, N.Y. Res: 342 E. Church St.

Reuben Daniels, C.E., Civil Eng'r, Pittsburg Plate Glass Co., Ford City, Pa.

George Herschel Davis, C.E., Asst. Eng'r, Vermont Marble Co., Proctor, Vt.

William Schaff Davis, C.E., Civil Eng'r and Surveyor, of the firm of Davis Bros., 519 Court St., Reading, Pa. Res: 49 N. 4th St.

Philip Hoffecker DeWitt, C.E., Weatherly, Pa.

Manuel Victor Domenech, C.E., Southern Dist. Eng'r Board of Public Works, Ponce, Porto Rico.

George Patterson Dravo, M.E., Purchasing Agt. for the Nordberg Mfg. Co., Builders of Corliss engines, high duty pumping engines, etc., Milwaukee, Wis. Res: 374 9th Ave.

Charles Wesley Focht, C.E., 15 N. Centre St., Pottsville, Pa.

George Steinman Franklin, M.E., with G. M. Steinman & Co., Hardware, 26 and 28 W. King St., Lancaster, Pa. Res: 337 W. Chestnut St.

Samuel Wilson Frescoln, C.E., Civil Eng'r and Contractor, Reading, Pa.

Louis Prevost Gaston, B.S. (in Mining and Metallurgy), C.E. ('89), Civil Eng'r, Somerville, N.J.

William Gates, jr., C.E., Asst. Chief Eng'r, H. C. Frick Coke Co., Scottsdale, Pa.

*James Bolan Glover, jr., M.E.

Hughlett Hardcastle, M.E., M.D. (Univ. Md. '95), Physician, Demonstrator of Diseases of the Throat and Nose, University of Maryland. Res: 513 Cathedral St., Baltimore, Md.

George Augustus Hart, M.E., Bethlehem Steel Co., S. Bethlehem, Pa. Res: 320 Packer Ave.

Robert Browne Honeyman, B.S. (in Mining and Metallurgy), of the firm of Shiland & Honeyman, Attorneys-at-Law, 71 Broadway, New York, N.Y.

Sterry Henry Jencks, C.E., Civil Eng'r, Berwind-White Coal Mining Co., Windber, Somerset Co., Pa.

Alfred Eli Lewis, jr., B.S., E.M. ('89), 1510 Chestnut St., Philadelphia, Pa.

Howard Hale McClintic, C.E., Vice Pres. and Asst. Gen. Mgr., Shiffler Bridge Co., 48th St. and A.V.R.R., Pittsburg, Pa. Res: 108 Fairmount Ave.

Walter Ashfield McFarland, M.E., Supt. Water Dept. of the District of Columbia, District Bldg., Washington, D.C.

Howard Leoser McIlvain, A.C., Reading, Pa.

James Struthers Mack, C.E., Mining Eng'r for Hempfield, Greensburg, and Carbon Coal Cos., Greensburg, Pa.

Charles Donnell Marshall, C.E., Sec. and Eng'r, Shiffler Bridge Co., Pittsburg, Pa. Res: 152 Fairmount Ave.

Charles Henry Miller, C.E., U. S. Surveyor, Mississippi River Commission. Mailing address: P.O. Box 101, New Madrid, Mo. Permanent address: Room 1115 Fullerton Bldg., St. Louis, Mo.

George Philips Miller, B.A. and M.A. (Bucknell), C.E., County Clerk and Recorder, Taos, New Mexico.

*John Hoff Milholland, C.E.

Harlan Sherman Miner, A.C., Asst. Chemist for the Welsbach Light Co., Gloucester City, N.J. Res: 10 N. Broadway.

Harry Semple Morrow, M.E., Latrobe Steel Co., Latrobe, Pa. Address: 732 Hill St., (Sta. D.), Pittsburg, Pa.

Daniel Livermore Mott, C.E., Civil Eng'r, 75 Arcade Bldg., Utica, N. Y. Res: 370 Genesee St.

William Lynville Neill, B.S. (Lat. Sci.), Attorney-at-Law, care of South Penn Oil Co. Res: New Martinsville, W.Va. Permanent address, Titusville, Pa.

Howard Seger Neiman, A.C., Mgr. Technical Dept., Wm. J. Matheson & Co., Ltd., 182-184 Front St., New York, N.Y.

*Harry Palmer, C.E.

Charles Jeremiah Parker, C.E., Div. Eng'r, N.Y.C. & H.R.R.R., Watertown, N.Y. Res: 64 Washington St.

Robert Swain Perry, A.C., Gen. Mgr. Southern Bauxite Mining and Mfg. Co., Cave Spring, Ga.

Francis William Birchall Pile, B.S., E.M. ('88). Permanent address: 50 Church St., Bethlehem, Pa.

Albert George Rau, B.S. (Sci.), Supt. Moravian Parochial School. Res: 63 Broad St., Bethlehem, Pa.

Clarence Elmer Raynor, C.E., New York Navy Yard. Res: 90 Lafayette Ave., Brooklyn, N.Y. Permanent address: Manorville, Long Island, N.Y.

William Pemberton Richards, C.E., Asst. Eng'r, District Offices, Washington, D.C. Res: 137 S St., N.W.

Osmond Rickert, C.E., Div. Supt. L. V. Coal Co., Lost Creek, Schuylkill Co., Pa.

William Richard Sattler, M.E., Contracting Eng'r, 26 Cortland St., New York, N.Y. Res: 609 N. Broad St., Elizabeth, N.J.

Eugene Hicks Shipman, C.E., Civil Eng'r, S. Bethlehem, Pa. Res: 721 Cherokee St.

William Alonzo Stevenson, M.E., Waverly, N.Y.

Wyndham Harvey Stokes, B.S., E.M. ('89), B.L. (Washington and Lee Univ. '96), Attorney-at-Law, Bluefield, Mercer Co., W.Va.

Wilmer Marshall Webb, M.E., Gen. Mgr., H. T. Paiste Co., Philadelphia, Pa. Res: 4921 Market St.

Harvey Musser Wetzel, C.E., Resident Eng'r, Santiago Div., Ferro Carril Central Dominicana, Puerto Plata, Republic of Dominica, West Indies. Res: Guanabano, R.D.

Winter Lincoln Wilson, C.E., Instructor in Civil Engineering, Lehigh University, S. Bethlehem, Pa. Res: 21 Wall St., Bethlehem, Pa.

Edward Benjamin Wiseman, C.E., Supervisor, Northern Central Ry., Shamokin, Pa.

Shuntaro Yamaguchi, C.E., (and Imperial Univ. of Tokio '72), Railway Dept., Mitsui & Co., Tokio, Japan. Res: 2 Fuzimaye Cho, Komagome, Tokio.

Luther Reese Zollinger, C.E., Supervisor Div. 28, P.R.R., Norristown, Pa.

CLASS OF 1889.

James Willoughby Anderson, B.S., E.M. ('90), Examiner, U. S. Patent Office, Washington, D.C.

*Pearce Atkinson, M.E.

Gustav Ayres, M.E., U. S. Patent Office. Address: 1311 New Hampshire Ave., Washington, D.C.

Ralph Putnam Barnard, C.E., LL.M., Lawyer, firm of Barnard & Johnson, Columbian Bldg., Washington, D.C. Res: Somerset Heights, Md.

Albert Harlan Bates, M.E., LL.B. (Ohio State Univ.), of Thurston & Bates, Patent Lawyers, 1028 Society for Savings Bldg., Cleveland, O. Res: 764 N. Logan Ave.

Samuel Erwin Berger, B.A, M.A. ('93), Asst. Prof. of Latin and Greek, Central High School, Philadelphia, Pa. Res: 129 E. Mt. Pleasant Ave.

Charles Hudson Boynton, B.S. (Lat. Sci.), Night Mgr., The Associated Press, Washington, D.C. Res: The Magnolia.

Joseph Leander Budd, A.C., Chemist and Assayer for the Keystone Watch Case Co., 19th and Brown Sts., Philadelphia, Pa. Res: 1629 Ontario St.

Rev. Edgar Campbell, B.A., Rector St. Peter's Church, Phœnixville, Pa.

Francis Joseph Carman, A.C., Producer of Petroleum, Bothwell, Ontario, Canada.

Herbert MacKenzie Carson, M.E., Asst. Eng'r of Motive Power, P.R.R., Altoona, Pa.

Holden William Chester, C.E., Shamokin, Pa.

William Corbin, B.S. (in Mining and Metallurgy), Druggist, Gillette, Colo.

Justice Cox Cornelius, C.E., with Wm. Wharton, Jr., & Co., Inc., 25th St. and Washington Ave., Philadelphia, Pa. Res: 405 Wister St., Germantown.

William Albert Cornelius, M.E., Supt. of 33″ Cog, 33″, 23″, and 10″ Structural Mills, Homestead Steel Works of The Carnegie Steel Co., Munhall, Pa. Res: Cor. Neville and Fifth Ave., Pittsburg, Pa.

Charles Herbert Deans, C.E., Pres. Engineering Contract Co., 71 Broadway, New York, N.Y. Res: 804 St. Nicholas Ave.

Charles Estell Dickerson, B.S. (Sci.), Vice-Principal, Mount Hermon School, in charge of dept. of Physics and Chemistry, Mount Hermon, Mass.

Emil Diebitsch, C.E., Supt. for John Peirce, Contractor for Public Buildings, 18 Oak St., Buffalo, N.Y. Res: 436 Virginia St.

John Webster Dougherty, B.S. (in Mining and Metallurgy), Asst. Supt., Pennsylvania Steel Co., Steelton, Pa.

Ralph Marshall Dravo, B.S. (in Mining and Metallurgy), with F. R. Dravo & Co., Eng'rs and Contractors, 812 Lewis Blk., Pittsburg, Pa. Res: Edgeworth, Sewickley P.O., Pa.

Ernest Hipolite Du Vivier, A.C., Mercantile, 22 Warren St., New York, N.Y.

*William Dolloway Farwell, B.A.

Henry William Frauenthal, A.C., M.D., Physician, 783 Lexington Ave., New York, N.Y.

Arthur Hugh Frazier, B.A., University Club, San Francisco, Cal.

Frederick Louis Grammer, B.S., E.M. ('90), Supt. of Furnaces, Lackawanna Iron and Steel Co., Lebanon and Cornwall. Address: Cornwall, Pa.

George Wentz Harris, B.S. (in Mining and Metallurgy), Eng'r. Res: 18 Lincoln St., Montclair, N.J.

Lightner Henderson, C.E., of the firm of Purdy & Henderson, Civil Eng'rs, 1553 Monadnock Bldg., Chicago, Ill., and 78 Fifth Ave., New York, N.Y.

Conrad Egbert Hesse, B.S. (in Mining and Metallurgy), 508 A St., S.E., Washington, D.C.

Clarence Walter Hudson, C.E., Asst. Eng'r, Phœnix Bridge Co., Phœnixville, Pa.

Archibald Johnston, M.E., Supt. Armor Plate Dept., The Bethlehem Steel Co. Res: 120 Church St., Bethlehem, Pa.

John Stower Kellogg, jr., A.C., Latrobe Steel and Coupler Co., Melrose Park, Ill. Res: 316 Ontario St., Oak Park, Ill.

John Martin Sharpless Kerlin, M.E., 3007 York St., Philadelphia, Pa.

Sylvanus Elmer Lambert, B.A., M.A. ('91), of the firm of Lambert & Martin, Attorneys and Counsellors-at-Law, 1010 Ashland Blk., Chicago, Ill.

John Joseph Lincoln, C.E., Chief Eng'r and Supt. Crozer Land Association, Elkhorn, W.Va.

John Lockett, M.E., Eng'r and Planter. Res: Kendal, Jamaica, W.I. Permanent address: Troja P.O., Jamaica, W.I.

Arthur Long, A.C., Merchant, Scranton, Pa.

John Joseph Martin, C.E., Asst. Eng'r, Dept. of Public Improvements, New York, N.Y. Res: 14 Hampden St., University Heights. Permanent address: 436 Lenox Ave.

*Charles Henry Miller, A.C.

Charles Williams Moffet, M.E.

Richard Henry Morris, jr., B.S. (in Mining and Metallurgy), Bristol, Pa.

William Ellis Morris, A.C., 19th and E Sts., Portland, Ore.

John Thomas Morrow, M.E., E.E. ('99), Supt. Electrolytic Copper Refining Plant of the Boston and Montana Consolidated Copper and Silver Mining Co., Great Falls, Mont.

Albert Daniel Oberly, C.E., Draftsman with H. C. Frick Coke Co., Scottdale, Pa.

Joseph Michael O'Malley, A.C., M.D., Physician, 2217 S. Broad St., Philadelphia, Pa.

Robert Henry Eddy Porter, M.E., of the firm of Porter & Remsen, Eng'rs and Contractors, 39 Cortland St., New York, N.Y. Res: 39 Washington Sq.

Arnold Karthaus Reese, B.S., E.M. ('90), Supt. Blast Furnace Dept., Maryland Steel Co., Sparrow's Point, Md. Res: 604 C St.

Abraham Lincoln Rogers, M.E., Pres. of the National Brewing Co., Jeannette, Pa.

Charles William Schwartz, jr., M.E., Sec. and Bus. Mgr. Philadelphia Textile Machinery Co., 2720 Hancock St., Philadelphia, Pa. Res: 108 W. Walnut Lane, Germantown, Pa.

Arthur Moult Smyth, B.S., E.M. ('90), 66 Quintarda, Rio de Janeiro, Brazil.

Alfred Walton Stockett, C.E., Mine Surveyor, Geldenhuis Deep Gold Mining Co., P.O. Box 1906, Johannesburg, S. A. R.

Lester Clark Taylor, C.E., F.C.Central Norte, Cordova, Argentine Republic, S.A.

Augustus Thompson Throop, C.E., Sec. Dobbie Foundry and Machine Co., Niagara Falls, N.Y. Res: 706 Buffalo Ave.

Charles Prentice Turner, M.E., with the International Correspondence Schools, Scranton, Pa. Res: 1214 Vine St.

Clarence Walker, B.S., E.M. ('90), Asst. to Eng'r of the Consolidated Traction Cos., *Times* Bldg., Pittsburg, Pa. Res: 5757 Parker St.

Fritz August Weihe, M.E., Ph.D. (Berlin '97), Prof. of Physics and Electrical Engineering, N. C. College of Agriculture and Mechanical Arts, Raleigh, N.C.

Walter Earle Weimer, A.C., 724 Cumberland St., Lebanon, Pa.

Harry Rush Woodall, B.S. (in Mining and Metallurgy), Second Asst., Second City Survey Dist., 630 Wood St., Philadelphia, Pa.

Edward Austin Wright, C.E., Asst. Examiner, U. S. Patent Office, Washington, D.C. Res: 208 T St., N.W.

Joseph Bodine Wright, C.E., Structural Eng'r, Chief Draftsman, Foster & Greene, Structural Eng'rs, 1123 Broadway, New York, N.Y. Res: 424 W. 23d St.

CLASS OF 1890.

Thomas C. J. Baily, jr., C.E., Asst. Eng'r, in charge of street improvements, N.W. and S.W. Sections, Washington, D.C. Res: 1207 Lydecker Ave.

Frederick Richard Barrett, C.E., Roadmaster, Pocahontas Division, Norfolk & Western Ry., Bluefield, W.Va.

Edwin Herbert Beazell, C.E., Supt. of Erection, Fort Pitt Bridge Works, Pittsburg, Pa. Res: 731 North Ave. (Sta. D).

Adolph Cardenas, C.E., Engineer Corps, Nicaragua Canal, Managua, Nicaragua, C.A.

William Phelps Cleveland, A.C., Mgr. W. P. Cleveland Analytical Laboratory, Joplin, Mo.

Frank Raymond Coates, B.S., E.M. ('91), Western Mgr., Weber Railway Joint Mfg. Co., Old Colony Bldg., Chicago, Ill. Res: The Anderson, 37th St. and Ellis Park.

Warren Scott Cope, C.E., Civil and Mining Eng'r, McDowell, W.Va.

Charles Ellery Coxe, B.S., E.M. ('91), Asst. to Mgr. of the Lixiviation Plant, Hacienda de Patas, Zacatecas, Mexico. Permanent address: Care of Mr. W. E. C. Coxe, Toledo, O.

James Barlow Cullum, A.C., General Sales Agt., Harbison & Walker Co., Pittsburg, Pa. Permanent address: Park Bldg.

John William DeMoyer, C.E., Supervisor, P. & R. R. R., Lebanon, Pa.

*Clement Heyser Detwiler, C.E.

Charles Edward Fink, C.E., Draftsman and Computer of Special Work, Street Railway Dept., Pennsylvania Steel Co., Steelton, Pa. Res: Camphill, Cumberland Co., Pa.

*Frederick Elmer Fisher, C.E.

Frank Roberts Fisher, C.E., Bureau of Surveys, 1845 N. 22d St., Philadelphia, Pa.

Howard Augustus Foering, B.S. (Sci.), Principal Lehigh Preparatory School, Bethlehem, Pa.

Ralph Goodman, C.E., Asst. Eng'r P.R.R., 32d St. and Powelton Ave., Philadelphia, Pa. Res: 1330 Spruce St.

George Ellsworth Greene, C.E., Asst. Eng'r, Erie Canal, 45 Triangle Bldg., Rochester, N.Y. Res: Lockport, N.Y.

Harry Walter Harley, M.E., care of H. M. Harley, Gloucester City, N.J.

David Garth Hearne, C.E., Eagle Fluor Spar Co., Wheeling, W.Va.

James S. B. Hollinshead, B.S., E.M. ('91), Mining Eng'r, Butte & Boston Consolidated Mining Co., Butte, Montana.

Frederick Kidder Houston, M.E., Artist. Res: Paris, France. Permanent address: Ridgewood, N.J.

William Vincent Kulp, C.E., with Milliken Brothers, Eng'rs and Contractors, 11 Broadway, New York, N.Y. Res: 327 W. 124th St.

Henry Meyers Kurtz, C.E., Gen. Supt. of Mines for Harbison & Walker Co., of Pittsburg, Clearfield, Pa.

Harry Kinzer Landis, B.S., E.M. ('91), Editor, 280 Broadway, New York, N.Y. Res: 204 Columbia Heights, Brooklyn, N.Y.

Thomas Smith Leoser, A.C., Publisher *Bonfort's Wine and Spirit Circular*, 34 Beaver St., New York, N.Y. Res: 451 Madison Ave., Elizabeth, N.J.

John Elmer Litch, M.E., Draftsman, Bethlehem Steel Co., S. Bethlehem, Pa. Res: Sun Inn, Bethlehem, Pa.

Charles Herbert Miller, A.C., C. H. Miller Hardware Co., Huntingdon, Pa.

George Nauman, jr., C.E., with the P.R.R. Engineer Corps, Delair, N.J.

Robert Engler Neumeyer, C.E., Borough Eng'r of Bethlehem, Pa., Borough Eng'r of S. Bethlehem, Water Supt. for the Bethlehem Water Co. Res: 16 Goepp St., Bethlehem.

William Cassidy Perkins, C.E., First Asst. Eng'r, Fairmount Park, Philadelphia, Pa. Res: 320 Winona Ave., Germantown, Pa.

Asa Emory Phillips, C.E., Asst. Eng'r Dept. of the District of Columbia, District Bldg., Washington, D.C. Res: Takoma Park.

Charles Platt, A.C., Ph.D. (Ohio Univ.), F.C.S., Consulting Chemist, Prof. of Chemistry and Toxicology, Hahnemann Medical College and Hospital; Lecturer on Chemistry, Children's Homeopathic Hospital, Philadelphia, Pa.

Alexander Potter, C.E., Consulting Civil Eng'r, Rooms 26-29, 157 Broadway, N.Y. Res: 104 Columbia Heights, Brooklyn, N.Y.

Edward Wiliams Pratt, M.E., Gen. Inspector, Chicago & Northwestern Ry., Chicago, Ill. Res: 425 S. Elmwood Ave., Oak Park, Ill.

Edwin Jay Prindle, M.E., LL.M., of Prindle & Russell, Lawyers, 509 7th St., Washington, D.C. (P.O. Box 73.)

Wallace Carl Riddick, C.E., Prof. of Mathematics and Civil Engineering, North Carolina College of Agriculture and Mechanic Arts, West Raleigh, N.C.

John Stover Riegel, M.E., Gen. Mgr., Warren Mfg. Co., 150 Nassau St., New York, N.Y. Res: 64 Riverside.

Joseph Edgar Sanborn, A.C., Chemist, Empire Zinc Works, Joplin, Mo. Res: 805 Moffet Ave.

Henry John Sherman, C.E., member of firm Henry S. Haines, Civil Eng'rs, Roads, Sewerage, Water Works, etc., 313 Masonic Temple, Camden, N.J. Res: Broad St., Mount Holly, N.J.

William Calvin Shoemaker, C.E., Asst. Supt. Dayton and Michigan Div. C. H. & D. Ry., Lima, Ohio.

Michael Druck Sohon, A.C., M.S. ('95), Ph.D. (Johns Hopkins), Instructor in Chemistry, Mixed High School, 3080 Third Ave., New York, N.Y. Res: 1184 Jackson Ave.

William Alston Stevenson, M.E., Supt., Stearns Mfg. Co., Engine, Boiler, and General Machine Builders, Erie, Pa. Res: 225 W. 11th St.

Theodore Alfred Straub, C.E., Vice-Pres. and Gen Mgr., Fort Pitt Bridge Works, Pittsburg, Pa. Res: Canonsburg, Pa.

Francis du Pont Thomson, M.E., Supt. Copper and Brass Rolling Mills, C. G. Husey & Co., Pittsburg, Pa. Res: 4737 Bayard St.

Charles Cookman Tomkinson, M.E., Chief Draftsman, for Stearns Mfg. Co., 329 W. 5th St., Erie, Pa.

Claude Allen Porter Turner, C.E., Principal Asst. Eng'r, Gillette-Herzog Mfg. Co., Minneapolis, Minn.

Aaron Howell VanCleve, C.E., Asst. Eng'r, Niagara Falls Power Co., in charge of drafting room and general construction, Power House, Niagara Falls, N.Y. Res: 5 W. C St.

José Ramon Villalon y Sanchez, C.E., Havana, Cuba.

Samuel Dexter Warriner, B.A. (Amherst), B.S., E.M. ('90). Supt. Calumet & Hecla Mining Co., Calumet, Mich.

David Thomas Williams, M.E., Asst. Inspector of Ordnance, U. S. A., Falls Rivet and Machine Co., Cuyahoga Falls, O.

Herbert Wright, M.E., Asst. Examiner, U.S. Patent Office, Washington, D.C.

CLASS OF 1891.

Murray Blachly Augur, E.E., Train Master, L. V. R.R., Buffalo, N.Y.

James Edwin Boatrite, C.E., B.A. (S. W. Presbn. Univ.), Asst. Eng'r, Cooper & Wigand, St. James Bldg., New York, N.Y. Res: Judson Hotel, Washington Sq. Permanent address: Care of John Blackmar, Columbus, Ga.

J. W. Boyd, C.E., Div. Eng'r, Coal Dept., Delaware and Hudson Canal Co., Room 25, D. & H. C. Co. Depot, Scranton, Pa.

John Emery Bucher, A.C., Ph.D. (Johns Hopkins), Associate Prof. of Chemistry, Rhode Island Agricultural College, Kingston, R.I.

Jacob Burr Buckley, E.E., Carpenter and Builder, Oxford, N.Y.

Emanuel Chao, C. E., Cienfuegos, Cuba.

Edward Haviland Coxe, C.E., Mining Eng'r, Sunday Creek Coal Co., Corning, Perry Co., O.

Warder Cresson, M.E., with L.V.R.R. Co., Swarthmore, Delaware Co., Pa.

John Rose Davis, C.E., Div. Eng'r, Chicago and Erie Div., Erie R.R., Huntington, Ind. Permanent address: Phoenixville, Pa.

Eric Doolittle, C.E., Flower Observatory, Upper Darby P. O., Philadelphia, Pa.

Alban Eavenson, A.C., Chemist, Patchell & Eavenson, wool scouring and carbonizing, 2025 Naudain St., Philadelphia, Pa. Res: 2013 Vine St.

Juan de la Cruz Escobar, M.E., Mechanical Eng'r and Contractor, Matanzas, Cuba.

Walton Forstall, E.E., Asst. Eng'r of Distribution, Philadelphia Gas Works, cor. Broad and Arch Sts., Philadelphia, Pa. Res: Ardmore, Pa.

John Stillwell Griggs, jr., M.E., Consulting Eng'r, 99 Cedar St., New York, N.Y. Res: 194 Park Pl., Brooklyn, N.Y.

George Samuel Hayes, C.E., Consulting and Contracting Eng'r, 111 Fifth Ave., New York, N.Y. Res: 53 Lexington Ave.

John Sidney Heilig, M.E., Sec. Lenox Mfg. Co. of Penna., Allentown, Pa. Res: 529 Allen St.

William Albert Heindle, C.E., Eng'r, Maintenance of Way, Washington Traction and Electric Co., Washington, D.C. Res: 1212 E. Capitol St.

John Franklin Hersh, C.E., Hardware Merchant, 825 Hamilton St., Allentown, Pa.

Hermann Victor Hesse, B.S., E.M. ('92), L. V. Coal Co., Lost Creek, Pa.

Paul Depue Honeyman, E.E., Chief Foreman, in charge of Underground and Central Office, The Metropolitan Telephone and Telegraph Co., 18 Cortlandt St., New York, N.Y.

John Turner Hoover, B.S. (in Architecture), Philipsburg, Pa.

Hagime Ichikawa, A.C., Imperial Printing Bureau, Tokio, Japan.

Albert Edward Juhler, A.C., Chemist, Standard Oil Co., Olean, N.Y. Res: 323 N. 14th St.

Henry Kemmerling, C.E., 2623 Main Ave., Scranton, Pa.

Herman Meriwether Knapp, C.E., Contracting Eng'r for the Pittsburg Bridge Co., American National Bank Bldg., Louisville, Ky.

Rev. Frederic Curtiss Lauderburn, B.A., Rector Calvary P. E. Church, Tamaqua, Pa.

Charles McKnight Leoser, B.S., E.M. ('92), Publisher *Bonfort's Wine and Spirit Circular*, 34 Beaver St., New York, N.Y. Res: 66 Harrison St., E. Orange, N.J.

James Anderson McClurg, B.S. (in Metallurgy), Meadvile, Pa.

Frank Anderson Merrick, E.E., Mgr. Motor Dept., Lorain Steel Co., Johnstown, Pa.

John Zollinger Miller, E.E., Mgr. and Supt. of the Mutual Telephone Co., Room 32, Downing Bldg., Erie, Pa.

Harry TimothyMorris, M.E., Armor Plate Dept., Bethlehem Steel Co., S. Bethlehem, Pa. Res: P.O. Bldg., Bethlehem. Permanent address: 403 E. Market St., Pottsville, Pa.

Paul Mayo Paine, C.E., Associate Editor, *The Post Standard*, Syracuse, N.Y. Res: 104 Madison St.

Edwin Addams Quier, A.C., Sec. Reading Fire Brick Works, Reading, Pa. Res: 302 S. 5th St.

Walter Freeman Rench, C.E., Asst. Supervisor P.R.R., St. Mary's, Pa.

Robert Schmitz, C.E., U. S. Surveyor, U. S. Eng'r's Office, Lock Box 812, Philadelphia, Pa. Res: 2551 N. 16th St.

Ellis Anstett Schnabel, B.A., M.A. ('93), Asst. Prof. of Latin and Greek, Central High School, Broad and Green Sts., Philadelphia, Pa. Res: 1630 N. 16th St.

Leidy Rudy Shellenberger, C.E., Draftsman Pencoyd Iron Works, Pencoyd, Pa. Res: 215 Rochelle Ave., Wissahickon, Philadelphia, Pa.

Ira Augustus Shimer, B.A., M.D. (Univ. Pa. '97), First Lieut. and Asst. Surgeon, U. S. A., U. S. General Hospital, Santiago de Cuba. Permanent address: Bethlehem, Pa.

Horace Theodore Stilson, C.E., 629 Salem St., Malden, Mass.

R. Paul Stout, M.E., Ordnance Designer, Bethlehem Steel Co., S. Bethlehem, Pa. Res: 332 Market St., Bethlehem.

James Edward Talmage, A.C., Ph.D., F.R.M.S., F.R.S.E., F.G.S., F.G.S.A., Deseret Professor of Geology, Univ. of Utah, Salt Lake City, Utah.

William Sidney Topping, B.S. (Lat. Sci.), Ph.G., Druggist, Main St., East Islip, N.Y.

Domingo Anthony Usina, C.E., U. S. Patent Office, Washington, D.C. Res: 409 15th St., N.W. Permanent address: 401 Waldburg St., W. Savannah, Ga.

Elias VanderHorst, C.E., with W. R. Fleming & Co., 620 Atlantic Ave., Boston, Mass.

George Edward Wendle, E.E., Lycoming Electric Co., Williamsport, Pa.

Peyton Brown Winfree, C.E., City Eng'r, Bradford, Pa.

CLASS OF 1892.

Rev. William North Robins Ashmead, B.A., Missionary, Chapel of the Prince of Peace, Gettysburg, Pa.

*George W. B. Asmussen, C.E.

Robert Ligget Baird, C.E., Eng'r Corps, P. R. R., Mifflintown, Pa.

Joseph Barrell, B.S., E.M. ('93), M.S. ('97), Graduate Student, Yale Univ., New Haven, Conn. Res: 373 Crown St.

*John Young Bassell, jr., B.S., E.M. ('95).

John Newbaker Bastress, C.E., with Shiffler Bridge Co., 1214 Betz Bldg., Philadelphia, Pa. Res: Overbrook, Pa.

John Mayall Beaumont, M.E., 125 S. 7th St., Scranton, Pa.

William Williams Blunt, E.E., Eng'r Westinghouse Electric Co., Ltd., Westinghouse Bldg., Norfolk St., Strand, London, W.C., England. Res: 51 Victoria St., London, S.W.

William Young Brady, B.S. (in Architecture), Architect, Stevenson Bldg., Sixth Ave., Pittsburg, Pa. Res: 525 Shady Ave.

Charles Merritt Case, B.S., E.M., ('93), Sec. and Treas. of Royal, Atlantic & Bagley Elevator Cos., Chamber of Commerce, Minneapolis, Minn. Address: Minneapolis Club.

George Price Case, B.S., E.M. ('93), Sec. Empire Elevator Co., 53 Chamber of Commerce, Minneapolis, Minn. Res: 1908 Park Ave.

Philip Lothrop Cobb, C.E., 2509 Euclid Ave., Cleveland, O.

Frederick Albert Coleman, C.E., City Eng'r, City Hall, Rome, N.Y.

Samuel Dewey Cushing, M.E., Asst. Supt. Binghamton General Electric Co., 79 State St., Binghamton, N.Y. Res: 52 Main St.

Herman Haupt Davis, M.E.

Morgan Davis, jr., B.S. (in Mining), Mining and Civil Eng'r, Coal Exchange, Scranton, Pa.

William Russell Davis, C.E., Chief Bridge Designer for State of New York. Res: 116 Lake Ave., Albany, N.Y.

Heber Denman, B.S. (in Mining), Coal Operator, Alderson, I.T.

Edwin Dodge, B.S. (in Metallurgy), Gouverneur, N.Y.

Percival Drayton, M.E., with Apollo Iron and Steel Co., Pittsburg, Pa.

*Harry S. Eckert, A.C.

Lester Hallett Ely, A.C., Salesman, Coxe Brothers & Co., 143 Liberty St., New York, N.Y. Res: 26 E. 3rd St., Bayonne, N.J.

George Washington Engel, B.S., E.M. ('93), with the Delaware & Hudson Coal Co., Scranton, Pa.

Thanlow Gjertsen, C.E., Eng'r in charge, Clinton Cement Co., Pittsburg, Pa. Permanent address: Saxton, Pa.

*John Adams Gruver, B.A.

William Lawall Jacoby, M.E., Sales Agt., Latrobe Steel and Coupler Co., 1720 Old Colony Bldg., Chicago, Ill.

Alfred Emerson Jessup, B.S. (in Metallurgy), Eng'r of Tests, Treasury Dept., Washington, D.C. Res: 1735 17th St., N.W.

Juan Jose Jimenez, C.E., 566 Washington Ave., Brooklyn, N.Y.

Herman Eugene Kiefer, A.C., M.S. ('94), Ph.D. ('96), Asst. Supt., Bonneville Cement Co. Res: Siegfried, Pa. Permanent address: 1434 13th Ave., Altoona, Pa.

Robert Reed Kitchel, M.E., with E. D. Leavitt, Mechanical Eng'r, Cambridgeport, Mass. Res: 371 Broadway, Cambridge, Mass.

Sylvester Welch Labrot, C.E., Asst. Eng'r, L. C. & L. Div., L. & N. R. R., Louisville, Ky. Res: St. James Court.

Henry Lefevre, B.S., E.M. ('93), Asst. Eng'r, Playa de Oro Gold Mining Co., Playa de Oro, Ecuador. Permanent address: Care of Henry Lefevre, Panama, Republic of Colombia, South America.

Alfred Emory Lister, M.E., Mechanical Eng'r for Delaware & Hudson Canal Co., Coal Dept., Room 27, D. & H. Depot, Scranton, Pa. Res: 921 Vine St.

William John Lloyd, E.E, Stanley Electric Mfg. Co., Pittsfield, Mass. Res: 48 Oxford St.

John Taylor Loomis, E.E., District Agt. Real Estate Dept., P. & R.Ry., Philadelphia, Pa. Res: 503 S. 41st St.

Henry Lewis Manley, B.S., E.M. ('93), Div. Eng'r, L. V. Coal Co., Hazleton, Pa. Res: 58 N. Laurel St.

Raymond S. Masson, E.E., Supt. Independent Electric Light and Power Co. Res: 327 Market St., San Francisco, Cal. Permanent address: Hammondsport, N.Y.

Edward James Millar, C.E., Civil and Sanitary Eng'r, 303 Peabody Bldg., Wheeling, W.Va.

Charles Tyler Mosman, E.E., Asst. Eng'r, Light Dept., General Electric Co., Schenectady, N.Y. Res: 18 Gillespie St.

Robert Blum Olney, C.E., Supt. of Sewers, City Hall, Charleston, S.C. Res: 139 St. Philip St.

Henry Orth, jr., B.S., E.M. ('93), Patent Attorney, 1011 L St., N.W., Washington, D.C.

Ramon Eckhart Ozias, B.S. (in Metallurgy), Assayer, U. S. Laboratory, 641 Washington St., New York, N.Y.

Frank DeWitt Randolph, M.E., Head Draftsman, Potter Printing Press Co. Res: 442 W. Front St., Plainfield, N.J.

Robert Swenk Rathbun, C.E., Lehigh Engineering Co., 323-324 "Commonwealth," Allentown, Pa. Res: 42 N. Jefferson St.

Samuel Arthur Rhodes, E.E., Engineering Dept., Chicago Telephone Co., Chicago, Ill. Res: 429 N. Pine Ave., Austin, Ill.

John Ira Riegel, C.E., Div. Eng'r, Auburn Div., L. V. R.R., Auburn, N.Y. Res: 28 Court St.

Anton Schneider, C.E., Asst. Eng'r, care of Geo. H. Pegram, Manhattan Railway, New York, N.Y. Permanent address: Summit Hill, Pa.

John Bonner Semple, A.C., Semple Bros., 421 Wood St., Pittsburg, Pa. Res: Sewickley.

Cass Knight Shelby, M.E., Asst. Foreman Car Inspector, P. R.R., Philadelphia, Pa. Res: 426 N. 32d St.

James Clausten Shriver, C.E., Civil Eng'r, 4 Water St., Cumberland, Md.

Philip Henry Waddell Smith, E.E., Asst. Gen. Mgr. of Standard Underground Cable Co., Westinghouse Bldg., Pittsburg, Pa. Res: 6730 McPherson St.

Michael Neligan Usina, E.E., Past Asst. Eng'r, U. S. N. Res: 401 Waldburg St., W. Savannah, Ga.

Lester Warren Walker, E.E., of L. W. Walker & Co., Electrical Eng'rs and Contractors, 40 Drayton St., Savannah, Ga.

David Heikes Witmer, C.E., Prin. Asst. Eng'r American Pipe Mfg. Co., 112 North Broad St., Philadelphia, Pa. Res: 3106 Clifford St.

Frederick Wittman, A.C., Attorney-at-Law, Allentown, Pa. Res: Lanark, Pa.

Charles Oaks Wood, M.E., of T. B. Wood's Sons, Manufacturers of Machinery for the Transmission of Power, Chambersburg, Pa.

Byron Edgar Woodcock, C.E., with the California Eastern Railway Co., 415 Currier Bldg., Los Angeles, Cal.

CLASS OF 1893.

George Haldeman Atkins, C.E., Pottsville, Pa.

Harry Jacobs Atticks, E.E., Lisburn, Pa.

Hugh Cunningham Banks, C.E.

Noble C. Banks, B.S. (in Metallurgy), Acting Gen. Mgr., Valley View Gold Mining Co., Telluride, Col. Permanent address: Care of John T. Graham, Esq., 604 Equitable Bldg., Denver, Col.

Herman Renner Blickle, C.E., Sec. and Chief Eng'r, Fort Pitt Bridge Works, Pittsburg, Pa.

William Irvin Boyd, C.E., Dist. Engineer's Office, No. 70 I St., N.E., Washington, D.C.

Frederick Edgar Bray, C.E.,Structural Draftsman, Shiffler Bridge Co., Pittsburg, Pa. Res: 227 Fisk St. Permanent address: Industry, Pa.

Gilbert Forbes Burnett, B.S. (Sci.), Clerk, Appraiser's Office, New York, N.Y. Res: Pequanac, N.J.

George Edwin Chamberlain, A.C., Supt. of The Glucose Sugar Refining Co., Chicago, Ill. Res: Marshalltown, Ill.

Warren Fellman Cressman, C.E., Sellersville, Pa.

Walter Joseph Dech, B.A., Teacher, Dept. of Greek, Albright College, Myerstown, Pa.

Rev. Charles Malcolm Douglas, B.A., Missionary, All Saints' Church, Leonia, N.J.

Charles Hazard Durfee, E.E., Insurance and Real Estate Broker, Treas. People's Cooperative Bank, 60 Bedford St., Fall River, Mass. Res: 807 High St.

Bernard Enright, A.C., Chief Chemist, Danville Bessemer Co., Danville, Pa. Res: Hotel Oliver.

Henry Brown Evans, M.E., Instructor in Mathematics and Astronomy, Univ. of Pa. Res: Flower Observatory, Upper Darby, Pa.

George Harwood Frost, M.E., B.A.Sc. (McGill Univ. '96). Permanent address: Care of *Engineering News*, New York, N.Y.

Frederick Pardee Fuller, E.E., Asst. Chief Foreman, Construction Dept., New York Telephone Co., 32 Gold St., New York, N.Y. Res: The Kenmore, 353 W. 57th St.

Robert Foster Gadd, C.E., Estimator, with Levering & Garrigues, 552-554 W. 23d St., New York, N.Y. Res: 67 W. 48th St.

Charles Willits Gearhart, E.E., Asst. Supt., Bridge Div., Brooklyn Rapid Transit Co. Res: 309 6th Ave., Brooklyn, N.Y.

Harvey Hartzell Godshall, A.C., of the firm of A. C. Godshall & Co., Millers, Lansdale, Pa.

Samuel Laury Graham, A.C., Analytical Chemist and Assayist, Rome Testing Laboratory, Rome, Ga.

Lee Stout Harris, C.E., Civil, Mining, and Electrical Eng'r, for Pulaski Iron Co., Eckman, W.Va.

Claude Sanford Haynes, C.E., Asst. City Eng'r, City Hall, Elmira, N.Y. Res: 205 W. Hudson St.

Richard Willis Heard, E.E., member of Mica Machine Co., Edgewood Park, Pa. Permanent address: "Three Oaks," Augusta, Ga.

Robert Culbertson Hays Heck, M.E., Instructor in Mechanical Engineering, Lehigh University, S. Bethlehem, Pa. Res: 422 Cherokee St.

Charles Lincoln Keller, M.E., with the Scherzer Rolling Lift Bridge Co., Chicago, Ill. Res: 5510 Washington Ave.

Schuyler Brush Knox, C.E.. Asst. Eng'r, Fort Pitt Bridge Works, Pittsburg, Pa. Res: Canonsburg, Pa.

Frank Sigismund Loeb, A.C., Gen. Mgr., Sterling Mfg. Co., Pittsburg, Pa.

Hiram Dryer McCaskey, B.S. (in Mining), Head Master, St. Thomas Hall, Holly Springs, Miss.

Charles Louis McKenzie, C.E., with the Shiffler Bridge Co., 1214 Betz Bldg., Philadelphia, Pa. Res: Lansdowne, Pa.

William Price Marr, E.E., Supt., Shamokin & Mt. Carmel Electric Ry. Co., Shamokin, Pa.

Archibald Stewart Maurice, C.E., Athens, Pa.

George Holbrooke Maurice, C.E,, Athens, Pa.

James Edgar Miller, M.E., Electrical Eng'r for the Siemens & Halske Electric Co. of America, 1215 Monadnock Blk., Chicago, Ill. Res: 2251 Calumet Ave.

William Frederick Mylander, C.E., 509 N. Carrollton Ave., Baltimore, Md.

Clinton Ledyard Olmsted, C.E., Eagle, N.Y.

Charles Joseph O'Neill, E.E., Asst. Examiner, Patent Office, Washington, D.C. Res: 910 Massachusetts Ave., N.E.

Nathaniel Montgomery Osborne, jr., C.E., 171 Freemason St., Norfolk, Va.

Charles William Parkhurst, E.E., Electrical Dept., Union Iron Works, San Francisco, Cal. Res: 133 Ellis St.

Duncan White Patterson, M.E., Inspector, R. W. Hildreth & Co., 602 Harrison Bldg., Philadelphia, Pa. Res: 1012 S. 48th St.

John Gates Peck, C.E., with Augustus Smith, C.E., 39 Cortlandt St., New York, N.Y. Res: 12 A E. 32d St., Bayonne, N.J.

Raymond Bernard Fitz Randolph, A.C., Associate Director, Dept. of Bacteriology, Hoagland Laboratory, Brooklyn, N.Y. Res: 106 Waverly Pl., New York, N.Y.

John Graham Reid, C.E., Chief of Surveys, Union Traction Co., Philadelphia, Pa. Res: 2412 Stanley St.

Edwin Clark Reynolds, C.E., Topographer, U. S. Survey for Deep Waterways, Cohoes, N.Y. Res: 87 Mohawk St.

Francis Evans Richards, C.E.

George William Ritchey, B.S. (Lat. Sci.), 26 Bluff St., Pittsburg, Pa.

Frederick Brittain Sage, E.E., Mgr. American Electric Specialty Co., 123 Liberty St., New York, N.Y. Res: Hackensack, N.J.

*Martin Luther Saulsbury, C.E.

Joseph A. Schloss, A.C., Public Assayer and Chemist, P.O. Box 65, Monterey, Mexico.

Armin Schotte, C.E., Consulting Eng'r, 406 Herrmann Bldg., Pittsburg, Pa.

William Frederick Semper,, A.C, Chemist, Haskel & Barker Car Co., 832 Pine St., Michigan City, Ind.

Alexander Beatty Sharp, B.S. (in Metallurgy), Gen. Mgr., W. L. Sharp & Son, manufacturing fireplace goods, Steubenville, O.

Noel W. Smith, C.E., Asst. Supervisor, P. R.R, Experimental Track Work. Res: Harrisburg, Pa. Permanent address: 1309 Scott St., Williamsport, Pa.

Edward Augustc Soleliac, B.S. (in Metallurgy), Asst. Mgr., Adelaide Silk Mills, Allentown, Pa. Res: 103 N. 4th St.

George Stern, B.A., Attorney-at-Law, 619 Mutual Life Bldg., Philadelphia, Pa.

William Remick Stinemetz, E.E., with the Westinghouse Electric and Manufacturing Co., Pittsburg, Pa. Res: 127 Linden Ave.

Thomas Harrison Symington, M.E., Supt. of Motive Power, Atlantic Coast Line R.R., Wilmington, N.C. Res: 314 Orange St.

John Taylor, A.C., 244 Market St., Bethlehem, Pa.

Lewis Esler Troutman, E.E., Testing Dept., General Electric Co., Schenectady, N.Y. Res: 563 Liberty St.

Fred Conover Warman, C.E., U. S. Asst. Eng'r, in local charge defenses of Washington, D.C., Fort Washington, Md. Res: 3225 16th St., N.W.

CLASS OF 1894.

*William A. Allgaier, B.S., E.M. ('95).

William Conklin Anderson, E.E., Supt. at Red Bank, N.J., for the Consolidated Gas Co. of New Jerey. Res: 47 Rector Pl., Red Bank, N.J.

George Washington Scott Baton, B.S. (in Mining), Div. Eng'r, with H. C. Frick Coke Co., Connellsville, Pa.

Irvin Isaac Beinhower, M.E., with The Lincoln Iron Works, Rutland, Vt. Res: Brock House.

Thomas Joseph Bray, jr., M.E., Sec. and Mechanical Eng'r, McGill & Co., Eng'rs and Machinists, 27th and Smallman Sts., Pittsburg, Pa. Res: 6720 Simen St.

Lawrence Calvin Brink, C.E., 166 W. 126th St., New York, N.Y. Employed by N. Y. C. & H. R. R. R. Co.

Rezeau Blanchard Brown, M.E., Gen. Supt., The American Gas Co., 222 S. 3d St., Philadelphia, Pa. Res: 5998 Woodbine Ave., Overbrook.

Emott Davis Buel, C.E, Chief of Hydrographical Party, U. S. Army Engineer Corps, Hudson River Improvement, 51 State St., Albany, N.Y. Res: 21 S. Hawk St.

James Lindsey Burley, C.E., Civil Eng'r, associated with Nathan F. Barrett, Landscape Architect, 50 Wall St., New York, N.Y. Res: Hotel Majestic, W. 72d St.

William Colwell Carnell, A.C., Chemist, Nelson Morris & Co., U. S. Yards, Chicago, Ill. Res: 3232 Wabash Ave.

Thomas Francis Carroll, B.S. (Lat Sci.), Towanda, Pa.

Alden Brown Diven, C.E., Sec., The La France Fire Engine Co., Elmira, N.Y.

Walter Jules Douglas, C.E., Asst. Eng'r to the Engineer Commissioner, Washington, D.C. Res: 1412 29th St.

Walter Sewell Dunscomb, C.E., Designer and Draftsman, Webster, Camp & Lane Machine Co., Akron, O.

Thaddeus Percival Elmore, C.E., Eng'r, Horseheads Bridge Co., Horseheads, N.Y.

Theodore Gwathmey Empie, E.E., Cable Dept., N. Y. and N. J. Telephone Co., 81 Willoughby St., Brooklyn, N.Y. Res: 301 Henry St.

Frank Faust, E.E., with The American Car and Foundry Co., Berwick, Pa.

James DuBose Ferguson, C.E.

Robert Ferriday, C.E., Asst. Eng'r, Chicago Terminal Div., Pennsylvania Lines, Chicago, Ill.

Richard Daniel Floyd, A.C., Mgr. Floyd Bros. & Co., 190 W. Broadway, New York, N.Y. Res: Hotel Endicott, 81st St. and Columbus Ave.

John Jacob Frank, E.E., General Electric Co., Schenectady, N.Y. Res: 442 State St.

Luther Lay Gadd, E.E., with Levering & Garrigues, 552-554 W. 23d St., New York, N.Y. Res: 67 W. 48th St.

Frank Wiseman Glading, M.A. (Phila. Central High School), M.E., M.S. (Cornell), with Leeds & Co., Philadelphia, Pa. Address: 2214 N. 20th St.

Milton Brayton Graff, A.C., Asst. Chemist for Proctor & Gamble Co., Ivorydale, O. Res: Bond Hill, O.

Elwood Aristides Grissinger, E.E., Electrical Eng'r and Salesman, Westinghouse Electric and Manufacturing Co., 782 Ellicott Sq., Buffalo, N.Y. Res: 273 Highland Ave.

Bayard Guthrie, M.E., Park Steel Co., 35th St. and A. V. R.R., Pittsburg, Pa. Res: 256 S. Highland Ave, E.E.

William McCleery Hall, M.A. (Franklin and Marshall), C.E., Asst. Master, Yeates Institute, Lancaster, Pa. Res: 30 W. King St.

Fletcher Dickerman Hallock, E.E., Electrical Engineering, 308 W. 5th St., Plainfield, N.J.

Arthur Williston Henshaw, E.E., Engineering Dept., General Electric Co., Schenectady, N.Y. Res: 8 Union St.

Anton Yost Hesse, C.E., with the Phoenix Bridge Co., Phoenixville, Pa.

Foster Haven Hilliard, C.E., U. S. Dredging Fleet, Mississippi River Improvement, New Madrid, Mo. Permanent address: Monroe, N.C.

William Emley Holcombe, E.E., with the General Electric Co., Schenectady, N.Y.

Matthias Harry Holz, M.E., 463 New City Hall, Philadelphia, Pa. Res: 1938 N. 11th St.

Alfred A. Howitz, M. E., Box 628, Newport News, Va.

George Washington Hunsicker, A.C., Teacher of Elementary Science in the Allentown High School. Res: 141 N. 8th St., Allentown, Pa.

George Cass Hutchinson, M.E., Cass Realty Corporation, 209 E. 23d St., New York, N.Y. Res: 509 Center St., S. Orange, N.J.

Arthur Bacon Jones, A.C., Treas. of Tate, Jones & Co., Mgr. of Baker & Adamson Chemical Co., Versailles, Wis. Res: Sewickley, Pa.

Barry Holme Jones, B.S., E.M. ('95), Bethlehem, Pa.

William Harrison Kavanaugh, M.E., Draftsman, Office Supt. of Motive Power P. R.R., Williamsport, Pa. Res: 1612 W. 4th St.

Richard Warren Knight, C.E., Engineering Dept., Shiffler Bridge Co., Pittsburg, Pa. Res: 216 Fisk St. Permanent address: 525 Royden St., Camden, N.J.

Claude Averett Langdon, C.E., Draftsman, Pennsylvania Steel Co., Steelton, Pa. Res: 1808 N. 4th St., Harrisburg, Pa.

Harry Donaldson Leopold, C.E., with Thomas Rodd, Chief Eng'r P.R.R. Co., Pittsburg, Pa. Res: 6345 Marchand St., E.E.

James Edwin Little, M.E., Draftsman, Bethlehem Steel Co., S. Bethlehem, Pa. Res: Hokendauqua, Pa.

Clarence Oliver Luckenbach, M.E., Teacher in Philadelphia, Pa., Public Schools. Res: 1718 N. 15th St.

Matthew McClung, jr., B.S. (in Metallurgy), Asst. Supt. of Blast Furnace, Lorain Steel Co., Lorain, O. Res: Hotel Topliff, Elyria, O. Permanent address: 502 Clinch St., Knoxville, Tenn.

John Douglas McPherson, E.E., Electrical Eng'r, care of Metropolitan Traction Co., Cable Bldg., 621 Broadway, New York, N.Y. Res: 447 4th Ave.

John VanSickle Martenis, M.E., with Terminal R.R. of the B. W. & W. Co., Pier 8, Robert Stores, Brooklyn, N.Y. Res: 464 9th St.

Joseph Oscar Mathewson, B.S. (in Metallurgy), Chemist for Ashland Coal & Iron Railway Co., Ashland, Ky.

*William Spencer Merrill, B.A., LL.B. (Cincinnati Law School).

Walter Hurxthal Miller, M.E., of the firm of Redding & Miller, Electrotypers, 794 Broad St., Newark, N.J.

Charles Asher Moore, E.E., Hammonton, N.J.

Julius Lederer Neufeld, E.E., Instructor in Mathematics, Central High School, Philadelphia, Pa. Res: 1905 Venango St.

Carl William Frederick Neuffer, C.E., Transitman for the Pennsylvania Coal Co., Dunmore, Pa. Res: 5th and Dudley Sts.

Charles Atwood Newbaker, E.E., with the Bell Telephone Co., Philadelphia, Pa. Res: 1333 Arch St.

Richard Leslie Ogden, A.C., Chemist, with the Carnegie Steel Co., Ltd., Duquesne, Pa.

Jeremiah Francis O'Hearn, C.E., Shenandoah, Pa.

Godwin Ordway, B.S. (in Metallurgy), Assayer and Mining Eng'r, Rossland, British Columbia.

William Arthur Payne, B.S. (in Architecture), Supt. of Construction for Ernest Flagg, Architect, 35 Wall St., New York, N.Y. Res: 147 W. 105th St.

William Vaughan Pettit, B.S. (in Metallurgy), Director of Manufacture of Clay Products of Staten Island Terra Cotta and Lumber Co. Res: 79 Water St., Perth Amboy, N.J.

Stephen Collins Potts, A.C., Asst. Chemist, P.R.R., Altoona, Pa. Res: 933 16th St.

Thomas Charles Roderick, E.E.

Frank William Roller, M.E., of the firm of Machado & Roller, Electrical Eng'rs and Contractors, 203 Broadway, New York, N.Y.

Charles Beecher Rutter, B.S. (in Mining), Asst. Eng'r, Lehigh Coal and Navigation Co., Lansford, Pa.

Herman Schneider, B.S. (in Architecture), Instructor in Civil Engineering, Lehigh University, S. Bethlehem, Pa. Res: 43 Wall St., Bethlehem, Pa.

Benjamin Ferdinand Schomberg, M.E., Draftsman, M.E. Office, P.R.R., Altoona Pa. Res: 1209 16th St.

Edgar Earnest Seyfert, C.E., Draftsman, Pottsville Iron and Steel Co., Pottsville, Pa.

George Elwood Shepherd, E.E., of the firm of Shepherd & Rust, Electrical Contractors, 22 N. Washington St., Wilkes-Barre, Pa. Res: 387 S. Main St.

Charles Elder Shipley, E.E., Garrison, Md.

Robert Eugene Smith, M.E., Draftsman, Bethlehem Steel Co., S. Bethlehem, Pa. Res: 135 W. Broad St., Bethlehem, Pa.

Herbert Ridley Stratford, A.C., Sec. The George Stratford Oakum Co., Jersey City, N.J. Res: 52 Danforth Ave.

Walter Christian Swartz, M.E., 525 Turner St., Allentown, Pa.

Frederick George Sykes, E.E., Operating Supt., Edison Electric Illuminating Co., 360 Pearl St., Brooklyn, N.Y. Res: 311 Washington Ave.

Charles Hamilton Thompson, B.S. (in Metallurgy), Mining Eng'r, Empire Steel & Iron Co., Goshen, Va. Permanent address: Berryville, Va.

Philip Henry Trout, jr., E.E., City Electrician, Lynchburg, Va. Permanent address: Staunton, Va.

Orson William Trueworthy, M.E.

Clarence Porter Turner, E.E., Wilkes-Barre, Pa.

Charles W. Underwood, E.E., Salesman, Westinghouse Electric & Mfg. Co. Res: 728 Ellicott Sq., Buffalo, N.Y.

Jacob Daniel Von Maur, C.E., Foreman Special Mains, United Gas Improvement Co., 1321 Filbert St., Philadelphia, Pa. Res: 19th and Venango Sts.

Edward Olmstead Warner, E.E., Mechanical and Electrical Engineering, Latrobe Steel & Coupler Co., 1720 Old Colony Bldg., Chicago, Ill. Res: The Kenton, Oak Park, Ill. Permanent address: Salisbury, Conn.

Ruel Chaffee Warriner, B.S. (in Mining), care of Crown Deep Ltd., Box 771, Johannesburg, S. A. R.

Aubrey Weymouth, C.E., with Cooper & Wigand, Eng'rs and Contractors, 1133 Broadway, New York, N.Y. Res: 123 W. 21st St.

Thomas William Wilson, C.E., Asst. Eng'r, International Traction Co., Buffalo, N.Y. Res: 448 Elmwood Ave.

Weldon Burris Wooden, C.E., of W. B. Wooden & Co., Newspaper Publishers and Job Printers, Hampstead, Md.

CLASS OF 1895.

Herman Leon Arbenz, C.E., Asst. City Eng'r, City Hall, Wheeling, W.Va.

Chester Terrill Ayres, E.E., with The People's Gas Light and Coke Co., Natural Gas Dept., Michigan Ave. and Adams St., Chicago, Ill. Res: 4118 Lake Ave.

Franklin Baker, jr., B.S. (in Mining), Treas. of the Franklin Baker Co., Manufacturers of Food Products, 233 N. Water St., Philadelphia, Pa. Res: 916 Farragut Terrace.

Clarence Kemble Baldwin, M.E., Draftsman, with Crocker-Wheeler Electric Co., Newark, N.J.

Anthony Francis Bannon, jr., C.E., Asst. City Eng'r, Bradford, Pa. Res: 206 South Ave.

John Collinson Barber, C.E., U. S. Deputy Mineral Surveyor. Res: Homestake Hotel. P.O. Box 835, Lead, S.D.

Robert Josiah Bartholomew, M.E., Bath, Pa.

Rollin Calvert Bastress, C.E., Draftsman, Berlin Iron Bridge Co., East Berlin, Conn.

Harry Wilber Beach, M.E., Manufacturer of Wood-working Machinery, Montrose, Pa.

George Wallace Beggs, C.E., with The York Mfg. Co., York, Pa. Res: National Hotel.

John Henry Best, C.E., Inspector, Illinois and Mississippi Canal. Res: 601 E. 2nd St., Sterling, Ill. Permanent address: Mechanicsburg, Pa.

Ernest Mar Blehl, E.E., Private Sec. to Supt. Western Union Telegraph Co., 1000 Chestnut St., Philadelphia, Pa. Res: 1520 Euclid Ave.

William Bowie, B.S. (Trinity), C.E. ('95), Aid, U. S. Coast and Geodetic Survey, Washington, D.C. Permanent address: Annapolis Junction, Md.

Charles Sumner Bricker, M.E., Testing Laboratory of the Chicago, Burlington & Quincy R.R., Aurora, Ill.

Robert Bruce Brinsmade, B.S. (Washington Univ., St. Louis), E.M. ('95), Draftsman, Mines of Anaconda Copper Mining Co., Butte, Mont.

James Emery Brooks, M.E., Contracting Agt., Shiffler Bridge Co., 45 Broadway, New York, N.Y.

Eugene Clare Brown, E.E., Asst. Examiner, U. S. Patent Office, Washington, D.C. Res: 7 Quincy St., N.E.

William Henry Brown, B.S., E.M. ('96), Mining Eng'r, Ashland, Pa. Res: Ellangowan, Shenandoah P.O., Pa.

Walter Turpin Brown, C.E., Bridge and Construction Dept., Pencoyd Iron Works, Pencoyd, Pa. Res: Osborne St., Wissahickon, Philadelphia.

James Hodgson Budd, C.E., with Engineering Bureau, 1030 Witherspoon Bldg., Philadelphia, Pa. Res: 809 Van Buren St., Wilmington, Del.

Charles Calvin Burgess, C.E., Draftsman, Alpha Portland Cement Co. Res: 18 Market St., Phillipsburg, N.J. Permanent address: Flemington, N.J.

John Thomas Callaghan, jr., B.S., E.M. ('96), Asst. Inspector of Hull Material for the U. S. Navy Dept., Pittsburg, Pa. Res:

209 S. Highland Ave., E.E. Permanent address: 30 Grant Pl., Washington, D.C.

Francis Lee Castleman, C.E., with New Jersey Steel and Iron Co., Trenton, N.J.

Robert Edes Chetwood, jr., E.E., Eng'r's Dept., American Telephone and Telegraph Co., 22 Thames St., New York, N.Y. Res: 415 N. Broad St., Elizabeth, N.J.

Arthur Stebbins Clift, M.E., General Electric Co., Schenectady, N.Y.

William Wheeler Coleman, B.S. (in Metallurgy), Metallurgist, with The Bethlehem Steel Co., S. Bethlehem, Pa.

William Joseph Collier, C.E., Draftsman, B. & C. Dept., Pennsylvania Steel Co., Steelton, Pa.

Morris Llewellyn Cooke, M.E., with Ketterhims Lithographic Mfg. Co., 4th and Arch Sts., Philadelphia, Pa. Res: Green St. and Walnut Lane, Germantown, Pa.

Herbert Maurice Crawford, C.E., Division Eng'r, with the H. C. Frick Coke Co., Scottdale, Pa.

Henry M. S. Cressman, B.A., Principal of Public Schools, Egg Harbor City, N.J.

Howard Stephen Deck, M.E., Mechanical Eng'r, Laflin & Rand Powder Co., 99 Cedar St., New York, N.Y. Res: Wayne, N.J. Permanent address: Mountain View, N.J.

Henry DeHuff, E.E., Electrical Eng'r, D'Olier Engineering Co., 125-127 S. 11th St., Philadelphia, Pa. Res: 601 N. 18th St.

Stanley Chipman deWitt, E.E., Inspector, Maintenance Dept., Bell Telephone Co., Philadelphia, Pa. Res: 813 N. Broad St.

James Chambers Dick, C.E., Eng'r for Kansas and Texas Coal Co., Pittsburg, Kansas.

Beekman DuBarry, jr., M.E., Motive Power Dept., P.R.R. Co., P.O. Box 112, Altoona, Pa.

Howard Eckfeldt, B.S., E.M. ('96), Mining Eng'r, Mazapil Copper Co., Ltd., Concepcion del Oro (*via* Laredo & Saltillo), Zacatecas, Mexico.

Alfred William Alexander Eden, C.E., Draftsman, Berlin Bridge Co., East Berlin, Conn. Res: 48 Maple St., New Britain, Conn.

Edward L. Faison, jr., C.E., Topographer on U. S. Geological Survey, Denison, Tex.

Guy Hector Farman, B.S. (in Metallurgy), 3400 Arapahoe St., Denver, Col.

Edward Calvin Ferriday, B.A., with Laflin & Rand Powder Co., New York, N.Y. P.O. Address: Box 2308.

Walter Ferris, M.E., Consulting Mechanical Eng'r, 931 Chestnut St., Philadelphia, Pa. Res: 142 Rochelle Ave., Wissahickon, Philadelphia.

*George Lane Gabrio, E.E.

Andres Garza Galan, C.E., Civil Eng'r, Ocampo 53 B, Monterey, Mexico.

Eduardo Antonio Giberga y Galé, M.E., Chief Eng'r, Electrical Dept., Spanish-American Light and Power Co., Consolidated, Monte 1, Havana, Cuba. Res: Virtudes 2 A.

John Jameson Gibson, E.E., Inspector, First Dist., Long Distance Branch, American Telegraph and Telephone Co., 18 Cortlandt St., New York, N.Y. Res: 151 State St., Brooklyn.

Elmer Grant Godshalk, A.C., Lansdale, Pa.

Wallace Russell Goss, C.E., Civil Eng'r, with the American Water Works and Guarantee Co., Pittsburg, Pa.

Frederick Taylor Haines, C.E., Attorney-at-Law, Elkton, Md.

Thomas Graham Hamilton, E.E., with the Consolidated Traction Co., Pittsburg, Pa. Res: 5912 Margaretta St.

Robert Rieman Harvey, E.E., Supt. Wyoming Valley Lace Mills, Wilkes-Barre, Pa. Res: 20 S. Franklin St.

Tomas Lloyd Henry, C.E., Klondike District, Alaska. Home address: 59 1st St., Troy, N.Y.

Howard Samuel Hess, B.A., law student, office of J. Davis Brodhead, Esq., S. Bethlehem, Pa. Home address: Hellertown, Pa.

Ira Miller Higbee, C.E., Sec. and Treas. Higbee Construction Co., Watsontown, Pa.

William Jacob Hiss, jr., E.E., Construction Dept., Metropolitan Telephone Co., 32 Gold St., New York, N.Y. Res: 69 E. 87th St.

William Hopkins, E.E., First Lieut. U. S. Marine Corps. Res: Marine Barracks, Navy Yard, Norfolk, Va. Address: Metropolitan Club, Washington, D.C.

Drew William Irvine, E.E., Electrician, Roanoke Electric Light and Power Co., Roanoke, Va. Res: 502 Church Ave., S.W.

Charles Borrows Jacobs, A.C., Supt. and Chemist of the Ampere Electro-Chemical Co., Ampere, N.J. Office, 44 Broad St., New York, N.Y.

Elmer Augustus Jacoby, B.A., Instructor in Mathematics, Perkiomen Seminary, Pennsburg, Pa.

William Agassiz James, B.S. (in Mining), Mining Eng'r, The Forest Mining Co., Scranton, Pa. Address: Peckville, Pa.

Henry Scudder Jaudon, C.E., Civil Eng'r, with Rittenhouse R. Moore, River and Harbor Improvement, Savannah, Ga. Res: 207 E. Gwinnett St.

Albert Beardsley Jessup, B.S., E.M. ('96), Engineering Dept., Shamokin Div., L. V. Coal Co., Centralia, Pa.

Elisha Barton John, C.E., Asst. Eng'r's Office, P.R.R. Res: Altoona, Pa. Permanent address: Bloomsburg, Pa.

Adolph Somers Kappella, E.E., Delaware and Atlantic Telephone Co., 504 Bell Telephone Bldg., 11th and Filbert Sts., Philadelphia, Pa.

Dixon Kautz, B.S. (Lat. Sci.), Deputy Collector, U. S. Customs, Seattle, Washington.

Warren Byron Keim, C.E., Erecting Dept. Phoenix Bridge Co. Mailing address: 612 Franklin St., Reading, Pa.

Henry Edward Kip, B.S. (in Architecture), Asst. Eng'r Union Carbide Co. Res: 241 Jefferson Ave., Niagara Falls, N.Y.

David Henshey Lackey, E.E., Mgr., Spring St. Office, New York Telephone Co., 138 Spring St., New York, N.Y. Res: 249 W. 55th St.

Rev. William Allen Lambert, B.A., Pastor of Emanuel English Lutheran Church, Albany, N.Y. Res: 162 2nd Ave.

Louis Edgar Lannan, E.E., Isthmian Canal Commission, Greytown, Central America. Res: 52 I St., N.W., Washington, D.C.

Arthur Hughes Lewis, B.S., E.M. ('96), with the L. V. Coal Co., Engineering Dept., Wilkes-Barre, Pa. Res: Plains, Pa.

Gerald Lewis, A.C., Milford, Pike Co., Pa.

Benjamin W. Loeb, A.C., Chemist and Assayer, H. C. Harrison, Mining Eng'r, Cerrabro, Nuevo Leon, Mexico.

Theodore Philip Lovering, E.E., Maintenance Dept., New York Telephone Co. Res: 216 Schermerhorn St., Brooklyn, N.Y.

Robert A. McKee, M.E., with the Baldwin Locomotive Works, Philadelphia, Pa. Res: 1834 Green St. Permanent address: Towanda, Pa.

Fayette Avery McKenzie, B.S. (Sci.), Modern Languages and Social Science, Juniata College, Huntingdon, Pa.

Stuart Tuttle McKenzie, C.E., with the Shiffler Bridge Co., 1214 Betz Bldg., Philadelphia, Pa. Res: Lansdowne, Pa.

Norman Peach Massey, C.E., with Cooper & Wigand, Eng'rs and Contractors, 1133 Broadway, New York, N.Y.

Carles Frazier Maurice, C.E., with G. H. Thomson & Co., 51 E. 44th St., New York, N.Y.

John Samuel Miller, M.E., Chief Draftsman, Harrisburg Foundry and Machine Works. Res: 225 N. 2nd St., Harrisburg, Pa.

Archibald D. Morris, M.E., Bristol, Pa.

William Spencer Murray, E.E., Eng'r and Salesman, Westinghouse Electric and Mfg. Co., Exchange Bldg., Boston, Mass. Permanent address: Annapolis, Md.

Robert Neilson, C.E., Asst. Supervisor, Elmira and Canandaigua Div., N. C. Ry., Elmira, N.Y. Res: 400 William St.

James Harry Philips, C.E., Instrumentman, C. & N. W. Ry., Boone, Ia. Res: Nevada, Ia. Permanent address: Atglen, Pa.

Joseph Philips, jr., B.S., E.M. ('96), Mining Eng'r for The Dahlonega Consolidated Gold Mining Co., Box 2, Dahlonega, Ga.

John Livingston Poultney, M.E., with the Southwark Foundry and Machine Co., Philadelphia, Pa. Res: 1536 Pine St.

Henry Crider Quigley, E.E., Manager for Ohio of The Security Trust and Life Ins. Co. of Philadelphia. Office: 1027 Garfield Bldg., Cleveland, O. Res: Parish House, Euclid Ave., cor. Percy.

William Reinecke, jr., B.S. (in Architecture), Asst. Eng'r, Charles Hegewald Co., New Albany, Ind. Res: 954 5th St., Louisville, Ky.

Eugene Jesse Rights, C.E., with the Engineering Dept. of the New York and Ottawa R. R. Co. Address: Care of Rev. T. M. Rights, Moravian Town, Ontario, Canada.

Herbert Timothy Rights, C.E., Bridge Inspector, L.V.R.R., S. Bethlehem, Pa. Res: 19 Cedar St., Bethlehem, Pa.

Samuel Neely Riter, M.E., Field Eng'r for Riter-Conley Co., care of Manitoba Electric and Gas Light Co., Winnipeg, Manitoba. Permanent address: 56 Water St., Pittsburg, Pa.

Eugene Schwinghammer, E.E., 409 7th St., S.W., Washington, D.C.

Henry Kent Seltzer, C.E., Instructor in Civil Engineering, University of Texas, Austin, Texas.

John Egbert Shero, A.C., Chemist, Pittsburg Reduction Co., Niagara Falls, N.Y. Res: 250 5th St. Permanent address: Fredonia, N.Y.

Robert S. Siegel, B.A., Bethlehem, Pa.

Edwin Harrison Sigison, E.E., City Inspector of Public Lighting, Room 7, City Hall, Buffalo, N.Y. Res: 57 Norwood Ave.

John Blake Slack, E.E., Attorney-at-Law, 1304 Atlantic Ave., Atlantic City, N.J. Permanent address: Mt. Holly, N.J.

Edwin George Steinmetz, E.E., Asst. Supt. The Electric Storage Battery Co., 19th St. and Allegheny Ave., Philadelphia, Pa. Res: 1606 N. Broad St.

John Eugene Stocker, B.S. (Sci.), Principal of High School, Bethlehem, Pa.

Robert Melvin Tarleton, B.S. (in Metallurgy), Mining Eng'r, Denver, Col. Address: Denver Athletic Club.

Robert Sayre Taylor, B.S. (Sci.), Attorney-at-Law, First National Bank Building, Bethlehem, Pa.

Nathaniel Thurlow, A.C., Chemist, Ampere Electro-Chemical Co., Ampere, N.J. Res: 55 New St., Newark, N.J.

Charles Frederick Townsend, B.S. (in Architecture), Draftsman for Brown & Von Beren, Architects, Exchange Bldg., New Haven, Conn. Res: 368 George St.

Joseph Boyer Townsend, E.E., Eng'r, Pittsburg Reduction Co. Res: New Kensington, Pa. Permanent address, Venetia, Pa.

John Frederick Van Benthem van den Bergh, C.E., Asst. to Chief of Maintenance Dept., Netherland-Indian Ry. Co., Samarang, Java, Dutch East Indies.

Wilard Randolph Van Liew, B.S. (in Metallurgy), Chemist, Electrolytic Refinery of Anaconda Copper Mining Co., Anaconda, Mont. Res: The Montana.

Charles Henry Vansant, C.E., with William P. Field, C.E., 823 Prudential Bldg., Newark, N.J.

William Warr, E.E., Gen. Supt. for Pepper & Register, Contractors, Fidelity Mutual Life Bldg., 112 N. Broad St., Philadelphia, Pa. Res: 436 N. 34th St.

Fred Irving Wheeler, C.E., Asst. on Fortification Construction at Plum Island, N.Y. Address: U. S. Engineer Office, New London, Conn.

Harry Amasa White, E.E., with White & Bro., Smelters and Dealers in Metals, 1505 E. Montgomery Ave., Philadelphia, Pa. Res: 1654 Vienna St.

John Crum Whitmoyer, E.E., Engineering Dept., Westinghouse Electric & Mfg. Co., E. Pittsburg, Pa. Res: 6800 Simen St.

Edward Newton Wigfall, A.C., Mgr. New Jersey Enamel Paint Co., Raritan, N.J. Mailing address: Box 257, Somerville, N.J.

John Marion Wilson, C.E., Maintenance of Way Dept., P.R.R., Williamsport, Pa. Mailing address: Hillsboro, Md.

Harold Lawden Wood, A.C., Upper Montclair, N.J.

Carlos Yglesias, B.S., E.M. ('96), San José, Costa Rica.

CLASS OF 1896.

William James Adams, jr., with the General Electric Co., Schenectady, N.Y. Res: 1 Union St.

William Stewart Ayars, M.E., Senior Third Asst. Eng'r, U. S. M. S. "St. Paul," American Line. Permanent address: 144 Dana St., Wilkes-Barre, Pa.

Hobart Bentley Ayres, M.E., Foreman of Erecting Shop, Schenectady Locomotive Works, Schenectady, N.Y. Res: 116 Barrett St. Permanent address: Westerly, R.I.

Albert Doane Ayres, C.E., taking course in Shopwork at E. P. Allis Shops, Milwaukee, Wis.

Arthur Davison Badgley, E.E., with the General Electric Co., Schenectady, N.Y. Res: 208 Liberty St.

Francis Hoskins Baldwin, E.E., Room 316, 60 Broadway, New York, N.Y. Res: 260 Crown St., New Haven, Conn.

Hasell Wilson Baldwin, M.E., Eng'r for the Carroll-Porter Boiler and Tank Co., Pittsburg, Pa. Res: Sewickley, Pa.

L. Warrington Baldwin, C.E., Civil Eng'r with the Illinois Central R.R., Fort Dodge, Iowa.

Springfield Baldwin, C.E., Draftsman, Ramapo Iron Works, Hillburn, N.Y. Address: P.O. Box 45.

George Pomeroy Bartholomew, B.S. (in Metallurgy), with Rand Gold Mining Co., Johannesburg, South African Republic.

Frederic Rawdon Bartles, C.E., Rodman P. & E. R.R., Middle Div., Renovo, Pa. Res: 955 W. 4th St., Williamsport, Pa.

Charles C. W. Bauder, E.E., New York Telephone Co., 129 E. 124th St., New York, N.Y. Res: 154 W. 123 St.

Fairfax Bayard, C.E., Asst. Examiner, U. S. Patent Office, Washington, D.C. Res: 1908 3d St., N.W.

Herbert Huebener Beck, A.C., Chemist, C. T. Miller Soap Works, Lancaster, Pa. Res: 105 S. Queen St. Permanent address: Lititz, Pa.

Edgar Tweedy Belden, C.E., Nazareth, Pa.

Moriz Bernstein, C.E., employed on Isthmian Canal Survey. Address: 1214 N. 2d St., Philadelphia, Pa.

Warren Joshua Bieber, B.A., Instructor, Lehigh Preparatory School, Bethlehem, Pa. Res: 25 N. Linden St.

Daniel William Bliem, C.E., Asst. to Eng'r of Bridges and Buildings, B. & O. R.R., Mount Royal Station, Baltimore, Md. Res: The Waldorf.

Benjamin Franklin Bossert, C.E., Phoenix Bridge Co., Phoenixville, Pa.

Howard Franklin Boyer, B.S. (Sci.), with Laflin & Rand Powder Co., Wayne, Pa.

Edward Elisha Bratton, C.E., with Detroit Bridge and Iron Co., Detroit, Mich Res: 150 Avery Ave.

Frank Shepard Bromer, M.E., Apprentice, L.V.R.R. Shops, Easton, Pa. Res: 234 Bushkill St.

Maximilian Joseph Bucher, A.C., with W. J. Matheson & Co., Ltd., 182 Front St., New York, N.Y.

George Amandus Buvinger, M.E., with Stillwell-Bierce & Smith-Vaile Mfg. Co., Dayton, O. Res: 29 Marshall St.

Aaron Beaumont Carpenter, E.E., Sec. and Treas. The Point Abnio Sand Co. 286 Pennsylvania St., Buffalo, N.Y.

Malcolm Carrington, E.E., Inspector, Richmond Railway and Electric Co., Richmond, Va. Address: 1316 Grove Ave.

Frank Leslie Cooke, E.E., Rich Patch Iron and Ore Co., Low Moor, Va. Permanent address: Hackettstown, N.J.

Eckley Samuel Cunningham, M.E., Supt. Carbon Mines, Anaconda Copper Mining Co. Res: Carbonado, Mont. Permanent address: Drifton, Pa.

Samuel Philip Curtis, M.E., Supt. New York Suburban Gas Co. Res: Mount Vernon, N.Y. Permanent address: Pen Yann, N.Y.

Frederic Allyn Daboll, C.E., care of Charles Warner Co., 1109 Land Title Bldg., Philadelphia, Pa. Permanent address: 322 E. 6th St., Plainfield, N.J.

John William Dalman, M.E., General Foreman, L.V.R.R. Shops, Buffalo, N.Y. Permanent address: 368 Fairfield Ave., Fort Wayne, Ind.

Samuel Moses Dessauer, B.S. (in Architecture), Chief Eng'r's Office, L.V.R.R. Co., S. Bethlehem, Pa. Res: 501 W. 4th St.

William Carter Dickerman, M.E., Purchasing Agt., Milton Car Works, Milton, Pa. Res: 541 Broadway.

Frank Oliver Dufour, C.E., Instructor in Civil Engineering, Lehigh University, S. Bethlehem, Pa. Res: 523 Cherokee St.

Edward Miall Durham, jr., C.E., with the U. S. Deep Waterways Commission, Cohoes, N.Y.

Edward Hiram Dutcher, jr., M.E., care of A. J. Corcoran, Jersey Ave. and 13th St., Jersey City, N.J.

Timothy Sharpe Eden, E.E., Draftsman, General Electric Co., Schenectady, N.Y. Res: 208 Liberty St.

George Ramsey Enscoe, C.E., Estimator for Shiffler Bridge Co., Pittsburg, Pa. Home address: 57 Lincoln Ave., Bennett, Pa.

Wiiliam Alvin Evans, B.S. (in Metallrgy), Summit Hill, Pa.

Charles Victor Ferriday, M.E., Draftsman, St. Anthony Falls Water Power Co., Minneapolis, Minn. Res: 610 8th St., S. Minneapolis.

Curtis Bertram Flory, E.E., Drawing Office, Dickson Mfg. Co., Scranton, Pa. Res: 1308 N. Washington Ave.

Clarence Richard Fountain, E.E., Draftsman, Baldwin Locomotive Works, Philadelphia, Pa. Res: 1316 Green St.

Thomas Joseph Gannon, M.E., with Westinghouse, Church, Kerr & Co., 26 Cortlandt St., New York, N.Y. Res: 31st St., Guttenberg, N.J.

James Brown Given, E.E., Cashier, Citizens' Bank of Ponca City, Ponca City, Oklahoma.

*John Savage Graff, E.E.

William Heald Groverman, M.E., Machinist Apprentice, C. & O. Ry., Huntingdon, W.Va. Res: 925 6th Ave.

David Hall, E.E., Purchasing Agt., Bullock Electrical Mfg. Co., 1032 Broadway, Cincinnati, O.

Henry Neff Herr, C.E., Civil Eng'r, 108 E. King St., Lancaster, Pa.

Howard Drysdale Hess, M.E., with the Pencoyd Iron Works, Pencoyd, Pa. Res: 1829 Master St., Philadelphia, Pa.

Robert Parsons Howell, C.E., Cartographic Draftsman, Hydrographic Office, Navy Dept., Washington, D.C. Permanent address: Blairstown, N.J.

William Steell Jackson, E.E., Asst. Examiner, U. S. Patent Office, Washington, D.C. Res: 325 Spruce St., N.W. Permanent address, Duncannon, Pa.

Victor Albert Johnson, B.S. (in Metallurgy), Mine Operator, Kaslo, British Columbia.

Victor Witmer Kline, C.E., with Isthmian Canal Commission at Greytown, Nicaragua, Central America. Permanent address: Box 1151, Lockport, N.Y.

Robert Edwin Kresge, A.C., Asst. Chemist, Bethlehem Steel Co., S. Bethlehem, Pa.

Robert Edward Laramy, B.A., M.A. ('99), Instructor, Senior Dept. Moravian Parochial School, Bethlehem, Pa. Res: 81 Broad St.

Bruce Emerson Loomis, E.E., Mgr., N. Y. and N. J. Telephone Co., W. New Brighton, Staten Island, N.Y.

Wheeler Lord, M.E., with American Iron and Steel Mfg. Co., Lebanon, Pa.

John Buckley McBride, C.E., Civil Eng'r and Surveyor, Deckertown, N.J.

Clifford Sherron MacCalla, E.E., Foreman of Construction, Edison Electric Illuminating Co., Brooklyn, N.Y. Res: 11 St. James Pl. Permanent address: 237 Dock St., Philadelphia, Pa.

Victor Emanuel Masson, A.C., Chemist and Asst. to Supt. of the Pleasant Valley Wine Co., Rheims, N.Y. Permanent address: Hammondsport, N.Y.

Edward Williamson Miller, B.S., E.M. ('97), Instructor in Lithology and Geology, Lehigh University, S. Bethlehem, Pa. Res: 628 Chestnut St.

Rafael de la Mora, M.E., Constructores y Controtistas, of the firm of Mora y Lopez de Lara, Ingenieros, Calle de San Francisco No. 17½, Guadalajara, Mexico.

Charles Howard Morgan, E.E., Asst. Examiner, U. S. Patent Office, Washington, D.C. Res: 43 R St., N.W.

William Hitz Mussey, E.E., Chief Draftsman, L.V.R.R., S. Easton, Pa. Res: The Vanderveer.

John Henry Myers, C.E., Lewistown, Pa.

Franklin Oberly, E.E., Easton, Pa.

Walter Raleigh Okeson, C.E., Eng'r with Phoenix Bridge Co., Phoenixville, Pa. Permanent address: 364 Broad St., Bethlehem, Pa.

Louis Atwell Olney, A.C., Prof. of Chemistry and Dyeing, Lowell Textile School, Lowell, Mass. Res: 201 Summer St.

Horace Lucius Palmer, C.E., U. S. Surveyor on U. S. Geological Survey in Indian Territory. Address: Denison, Tex.

Jacob Grafius Petrikin, B.S. (in Architecture), Lock Haven, Pa.

Morris Wright Pool, M.E., 234 W. 52d St., New York, N.Y.

James Lee Rankin, jr., M.E., Head Draftsman, American Tin Plate Co., Marquette Bldg., Chicago, Ill. Res: 3905 Lake Ave.

Henry Paul Reed, E.E., Electrical Eng'r, 254 S. Los Angeles St., Los Angeles, Cal. Res: 634 S. Hill St.

Homer Austin Reid, C.E., Asst. to Chief Eng'r, Greenbrier Ry., Ronceverte, W.Va. Permanent address: 111 N. Chestnut St., Warren, O.

George Homer Ruggles, C.E., Eng'r Corps, Illinois Central R.R., Belleville, Ill.

Clement Clarence Rutter, C.E., Asst. Eng'r, Monongah Coal and Coke Co., Monongah, W.Va.

John Cornelius Sesser, C.E., Asst. Eng'r, C. & N. W. Ry., Boone, Ia.

*Arthur Yeager Shepherd, M.E.

Luther D. Showalter, C.E., Pottstown, Pa.

Henry Shriver, M.E., Supt., Union Mines, Mt. Savage, Md. Res: 77 Washington St.

Edward Stewart Taylor, M.E., with Union Electric Co., 12 Huttenstrasse 87 N.W., Berlin, Germany. Permanent address: Fort Wayne, Ind.

William Bailey Taylor, E.E., Testing Dept., General Electric Co., Schenectady, N.Y.

John Augustus Thomson, B.S., E.M. ('97), Mining Eng'r, Mexico City, Mexico. Address: Care of Capt. T. Braniff, Paseo de la Reforma.

Edward Coppée Thurston, B.S. (in Metallurgy), Eng'r, Robinson Deep Mining Co., Johannesburg, South African Republic.

Joseph Wharton Thurston, B.A., Bethlehem Steel Co., S. Bethlehem, Pa. Res: 311 Cherokee St.

Curtis Edwards Trafton, E.E., with E. H. B. Brow & Co., Cotton Merchants, 42 Bedford St., Fall River, Mass. Res: 40 June St.

Harry Conklin Tripp, M.E., Mechanical Eng'r, with American Stoker Co., 141 Broadway, New York, N.Y. Res: 142 Montague St., Brooklyn, N.Y.

John Scofield Wallace, B.S. (in Metallurgy), Constructing Eng'r, Shenango Valley Steel Co., New Castle, Pa. Res: 68 N. Jefferson St.

Ulysses Grant S. Walters, C.E., Pottstown, Pa.

Harry Dallam Webster, M.E., Draftsman, Dickson Locomotive Works, Scranton, Pa. Res: 636 Adams Ave.

Frank Thomas Weiler, C.E., U. S. Eng'r's Office, Philadelphia, Pa. Res: 712 Union St., W.

Davis Sanno Williams, B.S. (in Architecture), Fort Snelling, Minn.

David William Wilson, jr., B.S. (in Architecture), with Charles C. Haight, Architect, 111 Broadway, New York, N.Y. Res: 381 Greene Ave., Brooklyn, N.Y.

J. Roberts Wilson, E.E., Construction Dept., New York Telephone Co., 32 Gold St., New York, N.Y. Res: 120 E. 28th St.

Alfred Mahlon Worstall, E.E., Contracting Eng'r, Witherspoon Bldg., Philadelphia, Pa.

CLASS OF 1897.

Francis DuPont Ammen, M.E., Clerk, Patent Attorney's Office, Room 1, 639 F St., N.W., Washington, D.C. Res: 1926 N St., N.W.

Henry Jonathan Biddle Baird, B.S. (in Metallurgy), with the Orford Copper Co., Constable Hook, N.J.

Lathrop Hutchings Baldwin, M.E., with the Vermont Marble Co., Proctor, Vt.

Charles Marshall Barton, C.E., Asst. Supervisor, L.V.R.R., White Haven, Pa. Permanent address: Pikesville, Ind.

Harry Layfield Bell, E.E., with The Augusta Telephone and Electric Co., Augusta, Ga. Res: 951 Broad St. Permanent address: Care of H. C. Hoggard & Co., Norfolk, Va.

William Ragan Binkley, E.E., Mgr. Amsterdam Automatic Telephone Co., 52 Market St., Amsterdam, N.Y.

Bertine Frederic Borhek, A.C., Chemist, West Branch Chemical Co. Res: 324 Elmira Ave., Williamsport, Pa.

Charles Schwartze Bowers, E.E., Mgr. Keystone Silk Weaving Co., Ltd., 170 Lehigh Ave. Res: 1606 N. 15th St., Philadelphia, Pa.

John Boyt, B.S., E.M. ('98), with Illinois Steel Co., So. Works, Chicago, Ill. Permanent address: Adamsford, Pa.

William Burke Brady, M.E., Brooklyn Rapid Transit Co. Res: cor. Gates and Grand Aves., Brooklyn, N.Y. Permanent address: 510 N. 2d St., Harrisburg, Pa.

Walter Everette Brown, E.E., Instructor in Practical Telephony for N. Y. & N. J. Telephone Co. Res: 191 Roseville Ave., Newark, N.J. Permanent address: Stamford, Conn.

Sinclair Wiggins Chiles, C.E., with the Engineering Contract Co. of New York at Ottawa, Ontario, Canada. P.O. address: Box 22, Hull, P.Q.

Thomas Holland Clagett, B.S. (in Metallurgy), with S. M. Taylor, Mining Eng'r, *Chronicle-Telegraph* Bldg., Pittsburg, Pa.

Barton Olmsted Curtis, C.E., Engineering Dept., Philadelphia. Wilmington & Baltimore R.R., 216 Washington St., Media, Pa.

Patrick Edward Dinan, A.C., Chemist, Alpha Portland Cement Works, Alpha, N.J. Res: 230 E. 3d St., S. Behlehem, Pa.

Louis Diven, E.E., Supt. The La France Fire Engine Co., Elmira, N.Y. Res: 957 Lake St.

Benjamin Irvin Drake, BS. (in Metallurgy), Mgr. Eynon-Evans Mfg. Co., 107 Liberty St., New York, N.Y. Res: 821 Second Pl., Plainfield, N.J.

Clifford George Dunnells, C.E., Engineering Dept., Pittsburg Bridge Co., 38th St. and A.V.RR.., Pittsburg, Pa.

Stuart Rhett Elliott, B.S. (in Metallurgy), Asst. Mining Eng'r, The Clevcland-Cliffs Iron Co.; City Eng'r, Ishpeming, Mich.

Albert Andrew Finkh, M.E., 214 Woodworth Ave., Yonkers, N.Y.

Ira D. Fulmer, E.E., Graduate Student, Princeton Univ. Res: 148 Nassau St., Princeton, N.J.

Francisco Martinez Galliardo, M.E., C.E. ('98), 17 Santuario St., Guadalajara, Mexico.

Orrin Satterlee Good, E.E., Construction Dept., Standard Underground Cable Co. of Pittsburg, 32 W. Georgia St., Indianapolis, Ind.

Ralph Scofield Griswold, E.E., Draftsman, with Columbia and Electric Vehicle Co., Hartford, Conn. Res: 61 Sigourney St. Permanent address: Madison, N.J.

William Thomas Hanly, C.E., with the Asst. Eng'r, Maintenance of Way Dept., P.R.R., Philadelphia, Pa. Res: 224 N. 21st St.

William Stephen Hiester, E.E., Electrical Eng'r, with Edison Electrical Co., Philadelphia, Pa. Res: 1935 N. 13th St.

Ross Nathaniel Hood, E.E., with Ginn & Co., 70 Fifth Ave.. New York, N.Y. Res: Batavia, N.Y. Permanent address: Duncannon, Pa.

Henry Taylor Irwin, M.E., Treas. Rosedale Foundry Co., Allegheny, Pa. Res: Sewickley, Pa.

Arthur Perkins Jenks, E.E., with the General Electric Co., 44 Broad St., New York, N.Y. Res: 604 W. 114th St.

Harry Sackett Johnson, E.E., Electrician, Niagara Falls Power Co., Niagara Falls, N.Y. Res: 128 3d St. Permanent address: East Aurora, N.Y.

Henry Harrison Jones, C.E., Instrumentman, care of Eng'r Second Track in Iowa, C. & N. W. Ry., Boone, Iowa. Permanent address: 846 Centre Ave., Reading, Pa.

Lawrence Rust Lee, M.E., with Henry R. Worthington, Mfg. of Pumping Machinery, Pittsburg, Pa. Res: 321 Lehigh Ave.

Telford Lewis, B.S. (in Metallurgy), Asst. Eng'r, Mining and Surveying Dept., Cambria Steel Co., Johnstown, Pa. Address: 135 Walnut St.

Charles Victor Livingston, E.E., with the General Electric Co., Schenectady, N.Y. Res: 7 State St. Permanent address: Kingston, N.Y.

Arthur Frost Loomis, E.E., with the New York Telephone Co., 138 Spring St., New York, N.Y. Res: 107 W. 105th St.

Barry MacNutt, E.E., M.S. ('98), Instructor in Physics and Electrical Engineering, Lehigh University, S. Bethlehem, Pa. Res: 27 S. Linden St., Bethlehem, Pa.

James Gordon Mason, B.S. (in Metallurgy), Asst. Surveyor, Robinson Deep Mine, Johannesburg, South African Republic. Permanent address: W. Pittston, Pa.

William Adams Megraw, M.E., Electrical Subway Commission, City Hall Annex, Baltimore, Md. Res: 1625 Eutaw Pl.

Esteban A. Mercenario, C.E., Corazon de Jesus No. 18, City of Mexico, Mexico.

Thaddeus Merriman, C.E., Asst. Eng'r U. S. Isthmian Canal Commission, Greytown, Nicaragua. Permanent address: S. Bethlehem, Pa.

Frank Douglass Mount, C.E., care of Ashmead & Hackney, Civil Eng'rs and Surveyors, Room 42, Law Bldg., Atlantic City, N.J.

Carl Pivany Nachod, E.E., Laboratory, Electro-Dynamic Co., 224 Ionic St., Philadelphia, Pa. Res: 706 S. Washington Sq.

Henry H. Newton, M.E., 49 Carmen St., Guadalajara, Mexico.

Robert Collyer Noerr, C.E., Draftsman, The Berlin Iron Bridge Co., East Berlin, Conn.

Harry Richards Peck, M.E., Draftsman, Erie R.R., Susquehanna, Pa. Permanent address: 1523 Price St., Scranton, Pa.

James Harkins Pennington, M.E., Supt. Motive Power, D.S. & S. R.R., Coxe Iron Mfg. Co., Cross Creek Coal Co., Drifton, Pa.

Morris Havens Putnam, M.E., with The Edward P. Allis Co., Buffalo, N.Y. Res: 321 W. Utica St.

John Peake Reynolds, jr., M.E., Draftsman, Maxwell Wyeth & Co., (Gas Engines), 65 Delevan St., Brooklyn, N.Y. Res: 404 Quincy St.

Samuel Stewart Riegel, M.E., Designer, Brooks Locomotive Works, Dunkirk, N.Y. Res: 750 Washington Ave. Permanent address: 523 Cherokee St., S. Bethlehem, Pa.

Eugene Peronnean Roundey, C.E., with W. S. Bacot, C.E., 1 Broadway, New York, N.Y. Res: 100 W. 85th St.

Woodford Royce, M.E., Draftsman, with The American Thread Co., Willimantic, Conn. Res: 140 Church St.

Auguste Leopold Saltzman, M.E., with The Walter Scott Printing Machine Co., Plainfield, N.J.

Charles Fred. Sanders, C.E., Kutztown, Pa.

Charles Francis Scott, E.E. Res: Rochelle Park, New Rochelle, N.Y.

Henry Hamilton Seabrook, E.E., Electrician for Waldorf-Astoria Hotel, New York, N.Y. Res: 345 W. 56th St.

Samuel Palmer Senior, C.E., with Engineering Contract Co., 71 Broadway, New York, N.Y.

Arthur Harold Serrell, E.E., with L. W. Serrell & Son, Solicitors of American and Foreign Patents, 302 Broadway, New York, N.Y. Res: 36 Myrtle Ave., Plainfield, N.J.

Frank Bradley Sheaffer, C.E., with R. A. Wentworth, Resident Eng'r, A. & W. Ry., Dayton, Pa.

John Leefe Sheppard, jr., M.E., with W. B. Smith Whaley & Co., Mechanical and Mill Eng'rs and Architects, Columbia, S.C.

Edward Peter Shuman, C.E., with American Lake Superior Power Co., Sault Ste. Marie, Mich.

Jonathan Edward Slade, C.E., Instrumentman, with Chicago & Northwestern R.R. Survey. Res: Boone, Iowa. Permanent address: 292 Ohio St., Chicago, Ill.

Francis Betts Smith, M.E., with the Sprague Electric Co., Bay Ridge, N.Y.

Harvey Wilson Sprague, M.E., Supt. Bethlehem Foundry and Machine Co., S. Bethlehem, Pa. Res: 615 Cherokee St.

Michael Thomas Stack, C.E., Engineering Corps, L. V. Coal Co., Lost Creek, Pa. Res: 314 E. Centre St., Shenandoah, Pa.

Alvin Riegel Sterner, E.E., 192 S. Common St., Lynn, Mass.

John Stewart, jr., B.S. (in Mining), Mining Eng'r for The Berwind-White Coal Mining Co., Herminie, Westmoreland Co., Pa.

Paul Beno Straub, E.E., Asst. Supt., Fort Pitt Bridge Works, Canonsburg, Pa. Res: 4921 Forbes St., Pittsburg, Pa

Thomas Cedwyn Thomas, B.S., E.M. ('98), Mining Eng'r and Asst. Metallurgist, Mazapil Copper Co., Ltd., Concepcion del Oro, *via* Saltillo and Laredo, Zacatecas, Mexico. Permanent address: 221 Lehigh St., Wilkes-Barre, Pa.

Wallace Treichler, C.E., City Eng'r, Rock Island, Ill. Res: 42d St. and 5th Ave.

William Edward Underwood, M.E., with F. R. Dravo & Co., Eng'rs and Contractors, Pittsburg, Pa.

Harrison Ricord Van Duyne, E.E., City Eng'r's Office, Newark, N.J. Res: 350 Summer Ave.

Charles Parker Wagoner, C.E., Phoenixville, Pa.

John Eugene Weideman, E.E., Washington, D.C.

Gilbert Case White, C.E., care of J. L. Ludlow, Consulting Eng'r, Winston, N.C. Permanent address: 1 E. Clay St., Richmond, Va.

George Livingston Yates, E.E., with New York Telephone Co., 15 Dey St., New York, N.Y. Res: 318 W. 57th St.

Ambrose Everett Yohn, M.E., with the Huntingdon and Broad Top Mountain Railroad and Coal Co. Res: Saxton, Pa.

Frank Steinmetz Young, B.S., Chemist for American Magnesia Co., Plymouth Meeting, Pa.

CLASS OF 1898.

Harry Leigh Adams, C.E., with The New York Telephone Co., 30 Gold St., New York, N.Y.

Alanson Quigley Bailey, B.A., Student, General Theological Seminary, Chelsea Sq., New York, N.Y.

Junius Ballard, M.E., Draftsman for H. C. Frick Coke Co., Scottdale, Pa. Permanent address: Louisburg, N.C.

Alejandro Barrientos, C.E., Asst. Eng'r of Sewer Dept., Havana, Cuba. Res: Consulado 132. Permanent address: St. Lucia, bj. 47 Santiago de Cuba.

Frank Breckenridge Bell, M.E., Mercer, Pa.

Henry David Bishop, M.E., Asst. Inspector of Ordnance, U. S. A., at Bethlehem Steel Works. Res: 20 Wall St., Bethlehem, Pa.

Henry Theodore Borhek, B.S. (in Metallurgy), E.M. ('99). Res: 508 Goepp St., Bethlehem, Pa.

Daniel John Broughal, A.C., S. Bethlehem, Pa.

Horatio Francis Brown, M.E., with Baltimore & Ohio R.R. Co. (Mt. Clare Shops). Res: 1127 St. Paul St., Baltimore, Md.

Paul Bucher, E.E., Inspector, 108 S. 40th St., Philadelphia, Pa. Res: 3927 Baltimore Ave. Permanent address: Lebanon, Pa.

David Hope Childs, B.S. (in Metallurgy), care of Pittsburg Reduction Co., Niagara Falls, N.Y. Res: 341 3d St. Permanent address: Towanda, Pa.

Herbert Myron Daggett, E.E., Electrical Eng'r, Welsbach Light Co., Gloucester, N.J. Res: 1923 Vine St., Phliadelphia, Pa. Permanent address: Elmira, N.Y.

George Davies, M.E. Res: Catasauqua, Pa.

William Adam Dehm, C.E., with the D. & H. Canal Co., D. & H. C. Co. Depot, Scranton, Pa. Res: 27 Union St., Wilkes-Barre, Pa.

Charles Meirs Denise, B.S. (Rutgers), C.E., with the Lehigh Engineering Co., Allentown, Pa. Res: 131 S. 4th St.

John Jacob Eckfeldt, M.E., with F. R. Dravo & Co., Eng'rs and Contractors, 812 Lewis Blk., Pittsburg, Pa. Res: 909 Arch St., Allegheny, Pa.

Linden Erle Edgar, M.E., Draftsman, Link Belt Engineering Co., Nicetown, Pa. Res: 223 W. Tulpehocken St., Germantown, Pa.

Edgar Davis Edmondston, E.E., with the United States Electric Lighting Co., Washington, D.C. Res: 1220 Massachusetts Ave.

Edgar Raymond Frisby, C.E., Aid, U. S. Coast and Geodetic Survey. Res: 1607 31st St., N.W., Washington, D.C.

Willard Boyer Fuller, M.E., 335 Bridge St., Catasauqua, Pa.

José Maria Garza Galán, B.S. (in Metallurgy), E.M. ('99). Home address: 21 Victoria St., Saltillo, Coahuila, Mexico.

Robert Edward Lee George, E.E., with the Baltimore Consolidated Street Railway Co., Baltimore, Md. Res: 116 W. North Ave.

William Gratz, E.E., with International Correspondence Schools, Scranton, Pa. Res: 527 Adams Ave. Permanent address: 214 Broadway, Camden, N.J.

Frank Hammond Gunsolus, C.E., Engineering Corps, P.R.R., 32d St. and Powelton Ave., Philadelphia, Pa. Res: 3217 Race St.

Wentworth Greene Hare, M.E., Draftsman, T. B. Wood's Sons, Chambersburg, Pa. Res: 34 S. 2d St. Permanent address: 111 S. 22d St., Philadelphia, Pa.

Raymond Hazel, E.E., Draftsman, Ordnance Office, War Dept., Washington, D.C. Res: 828 12th St., N.W. Permanent address: Cressona, Pa.

Henry Bruner Hershey, E.E., Draftsman and Computer of Special Work, Frog, Switch, and Signal Dept., Pennsylvania Steel Co., Steelton, Pa. Res: 324 Pine St.

Herbert Henninger Hess, E.E., Testing Dept., Crocker-Wheeler Electric Co., Ampere, N.J. Res: 275 6th Ave., Newark, N.J.

Edward Darling Hillman, M.E., Mgr. Harry Bentz Special Advertising Agency. Res: 57 W. 75th St., New York, N.Y. Permanent address: 1267 Broadway.

Harold John Horn, E.E., Electrical Eng'r, with J. A. Roebling's Sons Co., Trenton, N. J. Res: 36 W. State St.

Leonard Sherman Horner, E.E., Electrical Eng'r, 29 E. 21st St., New York, N.Y.

Frank Norman Kneas, C.E., Draftsman, Pencoyd Iron Works, Pencoyd, Pa. Res: Norristown, Pa.

Basil George Kodjbanoff, M.E., representing Franklin B. Yates, Saratoga Lincoln Spring and Carbonic Acid Gas, 48 Maiden Lane, New York, N.Y.

Jacob B. Krause, B.A., Principal of Public Schools, Madison Bldg., S. Bethlehem, Pa. Res: 460 Vine St.

Thomas H. Lawrence, E.E., Traffic Dept., New York Telephone Co., 55 Franklin St., New York, N.Y. Res: 318 W. 57th St.

John Brown Lindsey, jr., C.E., Resident Eng'r Alabama Southern R.R., Louisville & Nashville R.R. Co. Permanent address: 141 Wopping St., Frankfort, Ky.

Clarence Albert Loomis, C.E., Constructing Eng'r, The Canadian Electric Light Co., Chaudiere Falls, P.Q., Canada.

Lee Holmes Marshall, M.E., with Marshall Bros., Elevator Builders, Diamond St., Pittsburg, Pa. Res: 814 Lilac St., E.E.

*Charles Francis Moritz, E.E.

José Aristides de Obaldia, C.E., with the Guayaquil and Quito Ry. Co., Guayaquil, Ecuador. Permanent address: 895 Avenida Bolivar, David, Panama, Rep. Col.

John O'Reilly, A.C., Clothier, 3d and New Sts., S. Bethlehem, Pa. Res: 421 E. 3d St.

Howard Charles Paddock, C.E., Draftsman for The New England Structural Co., Everett, Mass.

Frederick Allen Perley, C.E., 309 Campbell St., Williamsport, Pa.

Carroll Winston Quarrier, M.E., Draftsman, with Julian Kennedy M.E., Pittsburg, Pa. Res: 6750 McPherson St., E.E. Permanent address: Charleston, W.Va.

Victor Clinton Records, C.E., P. W. & B. R. R. Engineer Corps, Wilmington, Del. Res: 1004 King St.

Percy Lawrence Reed, C.E., Engineering Dept., Boston & Albany R.R. Co., Boston Mass. Res: 38 Mansfield St., Allston, Mass.

Benjamin DeWitt Riegel, M.E., Treas. and Gen. Mgr. of the Riegel Sack Co., Jersey City, N.J

D'Arcy Wentworth Roper, M.E., Mgr. Cleveland Office of Buffalo Forge Co. 912 New England Bldg., Cleveland, O. Res: 735 Case Ave. Permanent address: 22 Market St., Petersburg, Va.

Rafael Francisco Sanchez, B.S. (in Metallurgy), E.M. ('99). Res: Gibara, Cuba.

Henry Cord Schwecke, E.E., Testing Dept., General Electric Co. Res: 104 S. Terry St., Schenectady, N.Y. Permanent address: Charleston, S.C.

Daniel Franklin B. Shepp, C.E., Eng'r Corps, Lehigh Coal and Navigation Co. Res: Lansford, Pa. Permanent address: Tamaqua, Pa.

B. Roland Smoot, A.C., Western Mgr., Dearborn Drug and Chemical Works, Chicago, Ill. 1543 Market St., Denver, Col.

Lewis Cheston Starkey, M.E., Principal of Maple Grove School, Byberry, Philadelphia, Pa. Res: Bustleton, Pa.

James Willis Stauffer, C.E., Office Eng'r Maintenance of Way L.V.R.R, S. Bethlehem, Pa. Res: 517 Pawnee St.

Martin Shaaff Stockett, B.A., Student, General Theological Seminary, New York, N.Y. Res: 175 9th Ave., Chelsea Sq. Permanent address: Pottsville, Pa.

E. Harrison Symington, M.E., Asst. to Master Mechanic, L.V.R.R. Shops, Sayre, Pa. Permanent address: 615 Park Ave., Baltimore, Md.

Edward Hileman Waring, M.E., with the Crocker-Wheeler Co., Ampere N.J. Res: 220 Springdale Ave., E. Orange, N.J. Permanent address: 57 Willow Ave., Plainfield, N.J.

Charles Bartlett Warren, M.E., Sec. of the W. Warren Thread Works, Westfield, Mass. Res: 83 Broad St.

Levi Watts, jr., E.E., Westinghouse Electric and Mfg. Co., E. Pittsburg, Pa. Res: 446 South Ave., Wilkinsburg, Pa.

Henry Storrs Webb, B.S., (M.I.T.), M.S., with the International Correspondence Schools, Scranton, Pa. Res: 225 Jefferson Ave.

Charles Edward Webster, jr., B.A., Student, College of Physicians and Surgeons, 59th St., New York, N.Y. Res: 36 W. 61st St.

Theodore Benjamin Wood, M.E., Asst. Supt. Omaha Gas Co. Res: 514 Park Ave., Omaha, Neb. Permanent address: Chambersburg, Pa.

Lawrence Wooden, C.E., 405 Water St., Baltimore, Md. Res: 519 N. Charles St. Permanent address: Hampstead, Md.

Warren Worthington, M.E., B.S. (in Metallurgy, '99), Asst. in Metallurgy, Lehigh University, S. Bethlehem, Pa. Res: 431 Cherokee St.

Samuel Augustus Yorks, jr., E.E., with the New York Telephone Co., 15 Dey St., New York, N.Y. Res: 154 Henry St., Brooklyn.

Harry Bernard Zimmele, A.C., Chemist, Oakland Chemical Co., 465 W. Broadway, New York, N.Y.

Harry Statten Zimmerman, C.E., Asst. to Div. Engr, Chicago & Erie Div., Erie R.R., Huntingdon, Ind.

CLASS OF 1899.

George Fred Allen, C.E., with Asst. Eng'r, U. S. Eng'r's Office, New Bedford, Mass. Permanent address: Florida, N.Y.

Leon Whetstone Bailey, E.E., Erecting Eng'r. Res: 1157 Elizabeth St., Denver, Col.

Richard Charles Becerra, A.C.

Maurice Clark Benedict, M.E., P.R.R. Shops at Juniata. Res: 805 Howard Ave., Altoona, Pa.

Arthur Knode Birch, E.E., Production Dept., Bullock Electric Mfg. Co., Cincinnati, O. Res: Norwood, Cincinnati.

Frank Elliott Bradenbaugh, M.E., Bethlehem Steel Co., S. Bethlehem, Pa. Res: Eagle Hotel, Bethlehem. Permanent address: 1110 Ann St., Parkersburg, W.Va.

John Morgan Buckland, B.S. (Sci.), Hokendauqua, Pa.

José Fernando Capriles, C.E., B.S. (in Architecture), Camejo á Colon 3, Caracas, Venezuela. Permanent address: Puerto Cabello, Venezuela.

Charles Ford Carman, C.E., Tariffville, Conn.

Bernard Todd Converse, M.E., with the Baldwin Locomotive Works, Philadelphia, Pa. Res: 1612 Green St.

John Peter Croll, C.E., Draftsman, in Frog, Switch, and Signal Dept., Pennsylvania Steel Co., Steelton, Pa. Res: Steelton, Pa. Permanent address: Trexlertown, Pa.

Rudolph Degener, M.E., Mills Bldg., New York, N.Y. Res: 5 W. 38th St., New York, N.Y.

Natt Morrill Emery, B.A. (Dartmouth), M.A., Instructor in English, Lehigh University, S. Bethlehem, Pa. Res: 129 Wall St., Bethlehem, Pa.

Robert Farnham, jr., C.E., Eng'r Dept. D.C., District Bldg. Res: 1103 M St., N.W., Washington.

José Gervasio Gandia, C.E., Asst. Eng'r of Public Works, Ponce, Puerto Rico. Res: Reina 42. Permanent address: San José 33, San Juan, P.R.

Eugene Gifford Grace, E.E., Asst. Electrician of Bethlehem Steel Co., S. Bethlehem, Pa. Res: 628 Cherokee St.

John Wesley Grace, jr., E.E., with the United Gas Improvement Co., Gardner Bldg., Mount Vernon, N.Y. Permanent address: Goshen, N.J.

William Gummere, A.C., Assistant in Chemistry, Lehigh University, S. Bethlehem, Pa. Res: 501 Seneca St.

Oscar Cooper Hannum, C.E., with Maintenance of Way Dept., P.R.R. Care of Asst. Eng'r, Philadelphia Div., Powelton Ave., Philadelphia, Pa. Res: 3701 Powelton Ave. Permanent address: Care Alex. Crowe, jr., 1212 Linn St.

George Augustus Horne, A.C., Chemist, Edison Portland Cement Co., Orange, N.J. Res: 40 Babcock Pl., W. Orange, N.J. Permanent address: Plainfield, N.J.

Roy Rhodes Hornor, B.S. (in Metallurgy), Graduate Student, Columbia Univ. Res: 218 W. 123d St., New York, N.Y. Permanent address: Clarksburg, W.Va.

George Reifsnyder Jackson, C.E., Asst. Mining Eng'r, Cleveland Cliffs Iron Co., Ishpeming, Mich. Permanent address: Rockwell Pl., Scranton, Pa.

Alexander T. Johnson, B.S. (in Metallurgy). Permanent address: Towanda, Pa.

Edward Allen Keys, C.E., Isthmian Canal Commission, Greytown, Nicaragua. Address: Linden, Md.

Russell Kimball, M.E., Wool Grower, "Kimbalton" ranch, Big Horn Co., Wyoming. Eng'r and Surveyor, Red Lodge, Mont. Address: P.O. Box 51, Red Lodge, Mont.

Arthur Warner Klein, M.E., Works Clerk, Essex and Hudson Gas Co., Newark, N.J. Res: 37 E. Park St.

John Henry Klinck, M.E. (Cornell), M.S., Supt. The Forman Stone Supply Co., Port Oram, N.J. Permanent address: 134 Broad St., Charleston, S.C.

Richard Skerrett Landron, C.E., San Juan, Puerto Rico.

Frederick John Litteil, M.E., with Bethlehem Steel Co. Res: 516 Cherokee St., S. Bethlehem. Permanent address: 15 W. 10th St., Erie, Pa.

George Kennedy McGunnegle, A.C., Meadville, Pa.

Owen Gray MacKnight, E.E., with New York Telephone Co., 15 Dey St., New York, N.Y.

Charles Michael Masson, M.E., with Westinghouse Electric and Mfg. Co., E. Pittsburg, Pa. Res: 724 Whiting Ave., Wilkinsburg, Pa. Permanent address: Hammondsport, N.Y.

William Lathrop Meaker, A.C., with Maryland Steel Co., Sparrow's Point, Md.

James Flanders Middledith, M.E., Money and Exchange Broker, New York, N.Y. Res: 80 Mercer Ave., Plainfield, N.J.

J. Foster Morgan, E.E., Harwood Mines, Pa.

Charles G. Newton, C.E., 49 Carmen St., Guadalajara, Mexico.

Henry Ralph Palmer, M.E., with Paterson & Passaic Gas and Electric Co., 146 Ellison St., Paterson, N.J. Res: 472 Broadway. Permanent address: West Chester, Pa.

John Read Pettit, B.S. (in Metallurgy), Eng'r, Manitenance of Way Dept., P.R.R. 1012 Spruce St., Philadelphia, Pa.

Louis Thomas Rainey, E.E., Equipment Dept. Bell Telephone Co., Philadelphia, Pa. Res: 1923 Vine St.

Percy Lesley Reed, C.E., with Asst. Eng'r of Pittsburg Div. P. R.R., Pittsburg, Pa. Res: 6730 Simen St. Permanent address: Care of A. E. Reed, Altoona, Pa.

Victor Hugo Reid, C.E., with Location Survey Vera Cruz & Pacific R.R., Mexico. Permanent mailing address: 282 Quincy St., Brooklyn, N.Y.

*Gustavo Rovelo, M.E.

Abraham Shimer, M.E., Draftsman with American Tin Plate Co., Chicago, Ill. Res: 154 E. 25th St., Chicago, Ill.

William Harold Speirs, B.S. (in Architecture), Graduate Student in C.E.; Lehigh University, S. Bethlehem, Pa. Res: 431 Cherokee St. Permanent address: 4410 Washington Blvd., St. Louis, Mo.

Abram Peters Steckel, E.E., Specification Dept., Bullock Electric Mfg. Co., Cincinnati, O. Res: cor. Marion and Norwood Sts., Norwood, Cincinnati, O. Permanent address: Lykens, Pa.

Robert Maximilian Straub, C.E., Engineering Dept., The Fort Pitt Bridge Works, Pittsburg, Pa. Res: 4921 Forbes St.

William Frederick Ulrich, A.C., Chemist, Bethlehem Steel Works. Res: 215 Broad St., Bethlehem, Pa.

John Sage Viehe, E.E., Instructor Electrical Engineering, Lehigh University, Res: 28 Market St., Bethlehem, Pa. Permanent address: 13 Howard St., Atlanta, Ga.

Frederick Charles Wettlaufer, A.C., Chemical Expert for the S. S. White Dental Mfg. Co. Res: Prince's Bay, N. Y. Permanent address: 917 W. End Ave., New York, N.Y.

Harry Anderson Wilcox, C.E., with Shiffler Bridge Co., Pittsburg, Pa.

George Herbert Wood, M.E., Draftsman, Signal Dept., L.V.R.R., S. Bethlehem, Pa. Res: 28 Market St., Bethlehem, Pa.

The number of graduates is 1077, degrees having been conferred as follows:

Upon graduates of the School of General Literature: B.A., 51; B.S., 23; Ph.B., 7; M.A., 11.

Upon graduates of the School of Technology: C.E., 374; M.E., 229; B.M., 19; B.S. (in Mining and Metallurgy), 99; E.M., 80; E.E., 149; A.C., 101; B.S. (in Architecture), 15; M.S., 7; Ph.D., 2.

Of these 10 have taken the degrees of B.A. and M.A.; 3 of B.S. and C.E.; 1 of B.S. and A.C.; 11 of B.M. and E.M.; 43 of B.S. and E.M.; 1 of B.S., B.M., and E.M.; 1 of B.M., E.M., and A.C.; 1 of B.S., E.M., and C.E.; 1 of C.E. and E.M.; 2 of A.C. and E.M.; 1 of M.E. and C.E.; 1 of M.E. and E.E.; 1 of E.E. and M.S.; 1 of A.C. and M.S.; 1 of B.S., E. M., and M.S.; 2 of A.C., M.S., and Ph.D. 1031 graduates are still living.

ONE-YEAR COURSE IN ELECTRICITY.

Beginning with the year 1884-85, the University offered a special course in Electricity, covering one year's work. Those who completed this course received certificates, but no degrees. In 1888, the full four-year course in Physics and Electrical Engineering, leading to the degree of E.E., was established, and the one-year course was withdrawn. The names of those who completed this course are not included in the Roll of Alumni, but are here given:

Elmer Ellsworth Boyer, '85, Foreman of Testing Dept., General Electric Co., Lynn, Mass.

Albert Brodhead, '88, 121 S. Centre St., Bethlehem, Pa.

Edward Conner, '86, Philadelphia, Pa.

William Fairchild Dean, '88, Mgr. Montreal Office, Canadian General Electric Co., Ltd., 1802 Notre Dame St., Montreal, Can. Res: 1264 Dorchester St.

Horace Musser Engle, '85, Economic Geology, Roanoke, Va.

Herman Frauenthal, '88, A.C., M.D., Physician and Surgeon, 783 Lexington Ave., New York, N.Y.

Walter George Fuller, '87, Electrician, Brattleboro, Vermont.

John Wesley Hackney, '87, City Surveyor, of the firm of Ashmead & Hackney, Civil Eng'rs and Surveyors, Room 42, Real Estate & Law Bldg., Atlantic City, N.J.

James Arthur Heaton, '86.

Richard Otto Albert Heinrich, '88, Gen. Mgr. European Weston Electrical Instrument Co., Ritterstrasse 88, Berlin, Germany.

William Hoopes, '86, Mgr. of Philadelphia Office of The American Electrical and Maintenance Co., 44 N. 4th St., Philadelphia, Pa.

Joseph Allison Horner, '88.

William Henry Hubbard, '88, 1026-1028 Filbert St., Philadelphia, Pa.

Walter Eugene Hyer, '86, College of Physicians and Surgeons, New York, N.Y. Res: 203 W. 87th St.

Daniel Henry Jenkins, '88, M.D., Physician, 1932 N. Main Ave., Scranton, Pa.

Charles Leavitt Jenness, '85, Sec. and Treas. The Avery & Jenness Co., 28 W. Washington St., Chicago, Ill. Res: 5823 Madison Ave.

William Sigler Jones, '87, Sec. The Quaker City Electric Co., 237-239 Dock St., Philadelphia, Pa. Res: 5144 Wayne Ave.

George Herman Koehler, '85.

Robert McAllister Lloyd, '86, Pres. Electric Vehicle Co., 100 Broadway, New York, N.Y. Res: 9 E. 9th St.

Dion M. Martinez, jr., '87.

Charles Jacob Meade, '86, Edison Electric Illuminating Co., 48 W. 20th St., New York, N.Y.

Charles Jacob Miller, '88, General Agt. New York Heat, Light, and Power Co., 33-43 Gold St., New York, N.Y. Res: 6 W. 21st St.

James Leidy Moore, '88, Supt., The Moorestown Electric Light, Heat & Power Co., Moorestown, N.J.

George Harrison Neilson, '86, Supt. Braeburn Steel Co., Braeburn, Pa. Res: Oakemont, Pa.

Horace Field Parshall, '87, Consulting Eng'r, 8 Princes St., Bank London, E.C., England. Res: Alton House, 23 Netherhall Gardens, Hempstead, London.

George Herbert Putnam, '85, Principal, Educational Dept. Kansas School for the Deaf, Olathe, Kansas.

Charles Norris Robinson, '88, with the Choctaw, Oklahoma & Gulf R. R., Girard Bldg., Philadelphia, Pa.

Harry Meyer Seitzinger, '88, Mgr. of Machine and Electrical Dept., J. G. Seitzinger Screen and Machine Works, 6 Northampton St., Wilkes-Barre, Pa.

Arthur Douglas Spear, '87, Standard Carbon Co., Cleveland, O.

Lewis Buckley Stillwell, '85, Electrical Director, Niagara Falls Power Co., Niagara Falls, N.Y. Res: The Lenox, Buffalo, N.Y.

Charles Wesley White, '88.

George Henry Wolle, '87, Supt. Bethlehem Electric Light Co., Bethlehem, Pa.; Supt. Bethlehem and Nazareth Ry. Co.

Hugh Carlyle Young, '88, Second Lieutenant, Co. I, 28th U. S. V., Manila, P.I. Permanent address: Wellsboro, Tioga Co., Pa.

OFFICERS OF THE ALUMNI ASSOCIATION OF THE LEHIGH UNIVERSITY, 1899-1900.

President:

WILLIAM R. BUTLER, Mauch Chunk, Pa.

Vice-Presidents:

DR. H. R. PRICE, Brooklyn, N.Y.

JAMES A. WATSON, Washington, D.C.

Archivist:

EDWARD H. WILLIAMS, JR., Bethlehem, Pa.

Secretary and Treasurer:

HARRY H. STOEK, 809 Quincy Avenue, Scranton, Pa.

Honorary Alumni Trustees:

W. ARTHUR LATHROP, Wilkes-Barre, Pa.
(Term expires June, 1900.)

FRANK P. HOWE, Philadelphia, Pa.
(Term expires June, 1901.)

THOMAS M. EYNON, Philadelphia, Pa.
(Term expires June, 1902.)

GARRETT B. LINDERMAN, South Bethlehem, Pa.
(Term expires June, 1903.)

Executive Committee:

W. R. BUTLER, *Chairman.*

W. A. LATHROP,	H. R. PRICE.
F. P. HOWE,	J. A. WATSON,
THOMAS M. EYNON,	E. H. WILLIAMS, JR.,
G. B. LINDERMAN,	H. H. STOEK.

ALPHABETICAL ALUMNI LIST.

A

H. L. Adams, '98.
W. J. Adams, jr., '96.
C. L. Addison, '88.
G. F. Allen, '99.
W. H. Allen, '85.
*W. A. Allgaier, '94.
F. DuP. Ammen, '97.
F. F. Amsden, '87.
J. W. Anderson, '89.
W. C. Anderson, '94.
F. C. Angle, '76.
H. L. Arbenz, '95.
*L. P. Ashmead, '70.
W. N. R. Ashmead, '92.
*G. W. B. Asmussen, '92.
G. H. Atkins, '93.
*P. Atkinson, '89.
H. J. Atticks, '93.
H. L. Auchmuty, '85.
M. B. Augur, '91.
W. S. Ayars, '96.
H. B. Ayers, '96.
A. D. Ayres, '96.
C. T. Ayres, '95.
G. Ayres, '89.

B

*E. K. Bachman, '83.
A. D. Badgley, '96.
A. Q. Bailey, '98.
L. W. Bailey, '99.
T. C. J. Baily, jr., '90.
H. J. B. Baird, '92.
R. L. Baird, '92.
F. Baker, jr., '95.
W. H. Baker, '73.
C. K. Baldwin, '95.
F. H. Baldwin, '96.
G. R. Baldwin, '88.
H. W. Baldwin, '96.
L. H. Baldwin, '97.
L. W. Baldwin, '96.
S. Baldwin, '96.
J. Ballard, '98.
C. L. Banks, '88.
H. C. Banks, '93.
N. C. Banks, '93.
A. F. Bannon, '95.
J. C. Barber, '95.
R. P. Barnard, '95.
J. N. Barr, '71.
J. Barrell, '92.
R. W. Barrell, '87.
F. R. Barrett, '90.
A. Barrientos, '98.
G. P. Bartholomew, '96.
R. J. Bartholomew, '95.
F. R. Bartles, '96.
C. M. Barton, '97.
*J. Y. Bassell, jr., '92.
J. N. Bastress, '92.
R. C. Bastress, '95.
A. H. Bates, '89.
E. A. Bates, '88.
G. W. S. Baton, '94.
C. C. W. Bauder, '96.

* Deceased.

F. Bayard, '96.
H. W. Beach, '95.
W. D. Beatty, '88.
J. M. Beaumont, '92.
E. H. Beazell, '90.
R. C. Becerra, '99.
C. J. Bechdolt, '75.
H. H. Beck, '96.
G. W. Beggs, '95.
I. I. Beinhower, '94.
E. T. Belden, '96.
B. B. Bell, '98.
H. L. Bell, '97.
M. C. Benedict, '99.
S. E. Berger, '89.
M. Bernstein, '96.
J. H. Best, '95.
W. J. Bieber, '96.
W. R. Binkley, '97.
A. K. Birch, '99.
*T. W. Birney, '85.
H. D. Bishop, '98.
G. P. Bland, '72.
E. M. Blehl, '95.
H. R. Blickle, '93.
D. W. Bliem, '96.
W. W. Blunt, '92.
J. E. Boatrite, '91.
A. Bonnot, '87.
H. A. Bonzano, '88.
G. R. Booth, '86.
B. F. Borhek, '97.
H. T. Borhek, '98.
B. F. Bossert, '96.
C. S. Bowers, '97.
W. Bowie, '95.
H. L. Bowman, '85.
J. W. Boyd, '91.
W. I. Boyd, '93.
H. F. Boyer, '96.
C. H. Boynton, '89.
J. Boyt, '97.
F. E. Bradenbaugh, '99.
W. Bradford, '88.
W. B. Brady, '97.
W. Y. Brady, '92.
E. E. Bratton '96.
F. E. Bray, '93.
T. J. Bray, jr., '94.
R. S. Breinig, '86.
C. S. Bricker, '95.
W. Briggs, '83.
L. C. Brink, '94.
R. B. Brinsmade, '95.
R. Brodhead, '70.
F. S. Bromer, '96.
J. E. Brooks, '95.
D. J. Broughal, '98.
E. C. Brown, '95.
H. F. Brown, '98.
J. H. Brown, '86.
R. B. Brown, '94.
W. E. Brown, '97.
W. H. Brown '95.
W. T. Brown, '95.
A. T. Bruegel, '88.
A. Bruner, '80.
D. P. Bruner, '72.
J. E. Bucher, '91.
M. J. Bucher, '96.
P. Bucher, '98.
C. A. Buck, '87.
J. M. Buckland, '99.
J. B. Buckley, '91.
J. C. Buckner, '87.
J. H. Budd, '95.
J. L. Budd, '89.
E. D. Buel, '94.

C. Bull, '78.
C. C. Burgess, '95.
O. C. Burkhardt, '88.
J. L. Burley, '94.
G. F. Burnett, '93.
C. N. Butler, '88.
H. A. Butler, '83.
W. R. Butler, '70.
G. A. Buvinger, '96.
M. L. Byers, '88.

C

J. T. Callaghan, jr., '95.
E. Campbell, '89.
A. M. Cañadas, '75.
J. F. Capriles, '99.
A. Cardenas, '90.
C. F. Carman, '99.
F. J. Carman, '89.
W. C. Carnell, '94.
A. B. Carpenter, '96.
M. Carrington, '96.
T. F. Carroll, '94.
H. M. Carson, '89.
*J. DeW. Carson, '76.
C. M. Case, '92.
G. P. Case, '92.
F. L. Castleman, '95.
G. E. Chamberlain, '93.
E. Chao, '91.
H. W. Chester, '89.
R. E. Chetwood, jr., '95.
D. H. Childs, '98.
S. W. Chiles, '97.
T. H. Clagett, '97.
C. E. Clapp, '86.
J. J. Clark, '88.
R. B. Claxton, '73.
F. L. Clerc, '71.
W. P. Cleveland, '90.
A. S. Clift, '95.
F. R. Coates, '90.
G. H. Cobb, '86.
P. L. Cobb, '92.
F. A. Coleman, '92.
W. W. Coleman, '95.
W. J. Collier, '95.
G. P. Connard, '88.
B. T. Converse, '99.
F. L. Cooke, '96.
H. V. Cooke, '83.
M. L. Cooke, '95.
R. G. Cooke, '84.
W. H. Cooke, '85.
W. S. Cope, '90.
H. St. L. Coppée, '72.
*J. H. H. Corbin, '69.
W. Corbin, '89.
J. C. Cornelius, '89.
W. A. Cornelius, '89.
C. E. Coxe, '90.
E. H. Coxe, '91.
W. S. Cranz, '81.
H. M. Crawford, '95.
H. M. S. Cressman, '95.
W. F. Cressman, '93.
W. Cresson, '91.
A. P. Crilly, '81.
F. J. Crilly, '83.
J. P. Croll, '99.
J. B. Cullum, '90.
B. A. Cunningham, '87.
E. S. Cunningham, '96.
J. S. Cunningham, '79.
B. O. Curtis, '97.
S. P. Curtis, '96.
S. D. Cushing, '92.

D

F. A. Daboll, '96.
H. M. Daggett, '98.
J. W. Dalman, '96.
F. W. Dalrymple, '83.
R. Daniels, '88.
G. Davies, '98.
G. H. Davis, '88.
H. H. Davis, '92.
J. R. Davis, '91.
M. Davis, jr., '92
W. R. Davis, '92.
W. S. Davis, '88.
W. H. Dean, '86.
C. H. Deans, '89.
W. J. Dech, '93.
H. S. Deck, '95.
R. Degener, '99.
*F. R. C. Degenhart, '72.
W. A. Dehm, '98.
H. DeHuff, '95.
J. W. DeMoyer, '90.
C. M. Denise, '98.
H. Denman, '92.
S. M. Dessauer, '96.
*C. H. Detwiler, '90.
P. H. DeWitt, '88.
S. C. deWitt, '95.
J. C. Dick, '95.
W.C. Dickerman, '96.
C. E. Dickerson, jr., '89.
E. Diebitsch, '89.
P. E. Dinan, '97.
A. B. Diven, '94.
E. Diven, '87.
L. Diven, '97.
E. Dodge, '92.
M. V. Domenech, '88.
T. J. Donahoe, '83.
A. Doolittle, '87.
E. Doolittle, '91.
J. W. Dougherty, '89.
C. M. Douglas, '93.
H. B. Douglas, '84.
W. J. Douglas, '94.
B. I. Drake, '97.
F. R. Dravo, '87.
G. P. Dravo, '88.
R. M. Dravo, '89.
P. Drayton, '92.
H. S. Drinker, '71.
B. DuBarry, jr., '95.
G. F. Duck, '83.
F. O. Dufour, '96.
M. M. Duncan, '80.
C. G. Dunnells, '97.
W. S. Dunscomb, '94
C. H. Durfee, '93.
E. M. Durham, jr., 96.
E. H. Dutcher, jr., '96.
E. H. DuVivier, '89.

E

J. Eagley, '77.
A. Eavenson, '91.
*H. S. Eckert, '92.
H. Eckfeldt, '95.
J. J. Eckfeldt, '98.
A. W. A. Eden, '95.
T. S. Eden, '96.
L. E. Edgar, '98.
E. D. Edmonston, '98.
W. N. Edson, '85.
S. R. Elliott, '97.
T. P. Elmore, '94.
L. H. Ely, '92.
N. M. Emery, '99.
L. O. Emmerich, '82.

T. G. Empie, '94.
G. W. Engel, '92.
*J. R. Engelbert, '85.
B. Enright, '93.
G. R. Enscoe, '96.
J. de la C. Escobar, '91.
H. B. Evans, '93.
W. A. Evans, '96.
T. M. Eynon, '81.

F

E. L. Faison, jr., '95.
G. H. Farman, '95.
R. Farnham, jr., '99.
*W. D. Farwell, '89.
E. F. Fassitt, '71.
F. Faust, '94.
M. H. Fehnel, '87.
J. DuB. Ferguson, '94.
C. V. Ferriday, '96.
E. C. Ferriday, '95.
R. Ferriday, '94.
W. Ferris, '95.
C. E. Fink, '90.
F. W. Fink, '86.
A. A. Finkh, '97.
*F. E. Fisher, '90.
F. R. Fisher, '90.
H. S. Fisher, '87.
C. B. Flory, '96.
R. D. Floyd, '94.
C. W. Focht, '88.
H. A. Foering, '90.
W. B. Foote, '84.
A. E. Forstall, '83.
W. Forstall, '91.
C. R. Fountain, '96.
J. J. Frank, '94.
G. S. Franklin, '88.
H. W. Frauenthal, '89.
A. H. Frazier, '89.
K. Frazier, '87.
*T. W. Frederick, '76.
S. W. Frescoln, '88.
F. Freyhold, '85.
E. R. Frisby, '98.
G. H. Frost, '93.
F. P. Fuller, '93.
W. B. Fuller, '98.
I. D. Fulmer, '97.

G

*G. L. Gabrio, '95.
L. L. Gadd, '94.
R. F. Gadd, '93.
A. G. Galan, '95.
J. M. G. Galan, '98.
F. M. Gallardo, '97.
J. G. Gandia, '99.
T. J. Gannon, '96.
L. P. Gaston, '88.
W. Gates, jr., '88.
C. W. Gearhart, '93.
R. E. L. George, '98.
E. A. Giberga y Galé, '95.
J. J. Gibson, '95.
P. D. Giess, '77.
*J. E. Gilbert, '78.
J. B. Given, '96.
T. Gjertsen, '92.
F. W. Glading, '94.
*A. M. Glassel, '77.
*J. B. Glover, jr., '88.
E. G. Godshalk, '95.
H. H. Godshall, '93.
N. O. Goldsmith, '83.
O. S. Good, '97.
R. Goodman, '90.

W. T. Goodnow, '83.
W. R. Goss, '95.
R. C. Gotwald, '86.
E. G. Grace, '99.
J. W. Grace, jr., '99.
*J. S. Graff, '96.
M. B. Graff, '94.
S. L. Graham, '93.
F. L. Grammer, '89.
W. Gratz, '98.
C. W. Gray, '81.
G. E. Greene, '90.
W. Griffith, '76.
J. S. Griggs, jr., '91.
E. A. Grissinger, '94.
R. S. Griswold, '97.
L. J. H. Grossart, '86.
W. H. Groverman, '96.
*J. A. Gruver, '92.
W. Gummere, '99.
F. H. Gunsolus '98.
B. Guthrie, '94.

H

C. W. Haines, '74.
F. T. Haines, '95.
*H. S. Haines, '87.
J. F. Halbach, '75.
B. F. Haldeman, '81.
D. Hall, '96.
W. McC. Hall, '94.
F. D. Hallock, '94.
T. G. Hamilton, '95.
M. S. Hanauer, '86.
W. T. Hanly, '97.
O. C. Hannum, '99.
H. Hardcastle, '88.
T. H. Hardcastle, '80.
W. G. Hare, '98.
H. W. Harley, '90.
H. T. Harper, '84.
G. W. Harris, '89.
L. S. Harris, '93.
G. A. Hart, '88.
W. D. Hartshorne, '74.
R. R. Harvey, '95.
S. J. Harwi, '86.
G. S. Hayes, '91.
C. S. Haynes, '93.
R. Hazel, '98.
S. C. Hazelton, '86.
W. C. Hazlett, '78.
R. W. Heard, '93.
D. G. Hearne, '90.
R. C. H. Heck, '93.
I. A. Heikes, '85.
J. S. Heilig, '91.
W. A. Heindle, '91.
G. M. Heller, '77.
L. Henderson, '89.
T. L. Henry, '95.
A. W. Henshaw, '94.
A. A. Herr, '74.
H. N. Herr, '96.
J. F. Hersh, '91.
H. B. Hershey, '98.
H. D. Hess, '96.
H. H. Hess, '98.
H. S. Hess, '95.
A. Y. Hesse, '94.
C. E. Hesse. '89.
H. V. Hesse, '91.
W. S. Hiester, '97.
I. M. Higbee, '95.
H. H. Hillegass, '84.
F. H. Hilliard, '94.
E. D. Hillman, '98.
W. J. Hiss, jr., '95.

J. B. Hittell, '87.
J. D. Hoffman, '83.
E. F. Hofford, '84.
W. E. Holcombe, '94.
J. S. B. Hollinshead, '90.
M. H. Holz, '94.
P. D. Honeyman, '91.
R. B. Honeyman, '88.
G. G. Hood, '83.
R. N. Hood, '97.
J. T. Hoover, '91.
C. C. Hopkins, '82.
W. Hopkins, '95.
G. L. Hoppes, '83.
H. J. Horn, '98.
G. A. Horne, '99.
L. S. Horner, '98.
R. R. Horner, '99.
H. S. Houskeeper, '72.
F. K. Houston, '90.
J. M. Howard, '87.
F. P. Howe, '78.
M. A. DeW. Howe, jr., '86.
R. P. Howell, '96.
A. A. Howitz, '94.
C. W. Hudson, '89.
G. W. Hunsicker, '94.
G. C. Hutchinson, '94.

I

H. Ichikawa, '91.
D. W. Irvine, '95.
H. T. Irwin, '97.

J

G. R. Jackson, '99.
W. S. Jackson, '96.
C. B. Jacobs, '95.
E. A. Jacoby, '95.
H. S. Jacoby, '77.
W. L. Jacoby, '92.
W. A. James, '95.
J. A. Jardine, '84.
H. S. Jaudon, '95.
S. H. Jencks, '88.
G. A. Jenkins, '70.
A. P. Jenks, '97.
A. B. Jessup, '95.
A. E. Jessup, '92.
J. T. Jeter, '80.
J. J. Jimenez, '92.
E. B. John, '95.
A. T. Johnson, '99.
H. S. Johnson, '97.
V. A. Johnson, '96.
A. Johnston, '89.
A. B. Jones, '94.
B. H. Jones, '94.
C. C. Jones, '87.
H. H. Jones, '97.
A. E. Juhler, '91.
C. A. Junken, '86.

K

A. S. Kappella, '95.
D. Kautz, '95.
W. H. Kavanaugh, '94.
W. B. Keim, '95.
C. L. Keller, '93.
J. S. Kellogg, jr., '89.
J. W. Kellogg, '84.
H. Kemmerling, '91.
J. M. S. Kerlin, '89.
D. G. Kerr, '84.
W. J. Kerr, '70.
E. A. Keys, '99.
H. E. Kiefer, '92.
W. F. Kiesel, jr., '87.

R. Kimball, '99.
C. F. King, '80.
H. E. Kip,'95.
R. R. Kitchel, '92.
J. W. Kittrell, '87.
A. W. Klein, '99.
J. H. Klinck, '99.
V. W. Kline, '96.
*L. E. Klotz, '72.
H. M. Knapp, '91.
F. N. Kneas, '98.
R. W. Knight, '94.
F. H. Knorr, '87.
S. B. Knox, '93.
B. G. Kodjbanoff, '98.
J. deB. Kops, '83.
J. B. Krause, '98.
R. E. Kresge, '96.
W. V. Kulp, '90.
H. M. Kurtz, '90.

L

S. W. Labrot, '92.
D. H. Lackey, '95.
N. Lafon, '78.
P. A. Lambert, '83.
S. E. Lambert, '89.
W. A. Lambert, '95.
O. M. Lance, '72.
H. K. Landis, '90.
R. S. Landron, '99.
C. A. Langdon, '94.
*S. D. Langdon, '87.
F. B. Langston, '84.
W. Langston, '84.
L. E. Lannan, '95.
G. L. de Lara, '86.
R. E. Laramy, '96.
W. A. Lathrop, '75.
F. C. Lauderburn, '91.
E. H. Lawall, '82.
J. P. S. Lawrance, '73.
T. H. Lawrence, '98.
J. W. Ledoux, '87.
L. R. Lee, '97.
H. Lefevre, '92.
H. D. Leopold, '94.
C. McK. Leoser, jr., '91.
T. S. Leoser, '90.
A. E. Lewis, jr., '88.
A. H. Lewis, '95.
G. Lewis, '95.
T. Lewis, '97.
J. J. Lincoln, '89.
G. B. Linderman, '87.
R. P. Linderman, '84.
J. B. Lindsey, jr., '98.
A. E. Lister, '92.
J. E. Litch, '90.
F. J. Littell, '99.
J. E. Little, '94.
C. V. Livingston, '97.
W. J. Lloyd, '92.
J. Lockett, '89.
B. W. Loeb, '95.
F. S. Loeb, '93.
A. Long, '89.
A. F. Loomis, '97.
B. E. Loomis, '96.
C. A. Loomis, '98.
J. T. Loomis, '92.
W. Lord, '96.
T. P. Lovering, '95.
C. A. Luckenbach, '86.
C. O. Luckenbach, '94.
W. A. Lydon, '86.

M

J. B. MacBride, '96.
C. S. MacCalla, '96.
W. H. MacCarthy, '71.
H. D. McCaskey, '93.
H. H. McClintic, '88.
M. McClung, jr., '94.
J. A. McClurg, '91.
W. A. McFarland, '88.
C. W. Macfarlane, '76.
G. K. McGunnegle, '99.
H. L. McIlvain, '88.
R. A. McKee, '95.
C. L. McKenzie, '93.
F. A. McKenzie, '95.
S. T. McKenzie, '95.
O. G. MacKnight, '99.
B. MacNutt, '97.
J. D. McPherson, '94.
S. J. Mack, '88.
R. W. Mahon, '76.
J. J. deG. Malcher, '76.
H. L. Manley, '92.
W. P. Marr, '93.
C. D. Marshall, '88.
L. H. Marshall, '98.
J. F. Marsteller, '97.
J. VanS. Martenis, '94.
J. J. Martin, '89.
J. G. Mason, '97.
N. P. Massey, '95.
C. M. Masson, '99.
R. S. Masson, '92.
V. E. Masson, '96.
J. O. Mathewson, '94.
A. S. Maurice, '93.
C. F. Maurice, '95.
G. H. Maurice, '93.
A. E. Meaker, '75.
W. L. Meaker, '99.
W. A. Megraw, '97.
H. S. Meily, '87.
E. A. Mercenario, '97.
J. F. Merkle, '84.
F. A. Merrick, '91.
*W. S. Merrill, '94.
T. Merriman, '97.
T. Merritt, '74.
J. F. Middledith, '99.
E. J. Millar, '92.
Charles Henry Miller, '88.
*Charles Henry Miller, '89.
Charles Herbert Miller, '90.
E. F. Miller, '83.
E. W. Miller, '96.
G. P. Miller, '88.
J. E. Miller, '93.
J. S. Miller, '95.
J. Z. Miller, '91.
W. H. Miller, '94.
*J. H. Millholland, '88.
P. D. Millholland, '86.
H. S. Miner, '88.
H. B. de Miranda, '73.
R. F. de Miranda, '72.
*S. Miyahara, '77.
C. W. Moffett, '89.
C. A. Moore, '94.
R. de la Mora, '96.
W. F. More, '83.
C. H. Morgan, '96.
J. F. Morgan, '99.
*C. F. Moritz, '98.
A. D. Morris, '95.
H. T. Morris, '91.
R. H. Morris, jr., '89.
W. E. Morris, '89.
J. Morrison, '75.

H. S. Morrow, '88.
J. A. Morrow, '87.
J. T. Morrow, '89.
N. Morrow, '83.
R. T. Morrow, '82.
C. T. Mosman, '92.
D. L. Mott, '88.
F. D. Mount, '97.
W. S. Murray, '95.
W. H. Mussey, '96.
H. K. Myers, '84.
J. H. Myers, '96.
W. F. Mylander, '93.

N

C. P. Nachod, '97.
G. Nauman, jr., '90.
W. L. Neill, '88.
R. Neilson, jr., '95.
H. S. Neiman, '88.
J. L. Neufeld, '94.
C. W. F. Neuffer, '94.
R. E. Neumeyer, '94.
C. A. Newbaker, '94.
C. G. Newton, '99.
H. H. Newton, '97.
D. K. Nicholson, '85.
T. Nicholson, '83.
H. B. C. Nitze, '87.
R. C. Noerr, '97.
B. B. Nostrand, jr., '78.
A. R. Nuncio, '84.

O

J. A. de Obaldia, '98.
A. D. Oberly, '89.
F. Oberly, '96.
R. L. Ogden, '94.
J. F. O'Hearn, '94.
W. R. Okeson, '96.
C. L. Olmsted, '93.
L. A. Olney, '96.
R. B. Olney, '92.
J. M. O'Molley, '89.
C. J. O'Neill, '93.
G. Ordway, '94.
J. O'Reilly, '98.
H. Orth, jr., '92.
N. M. Osborne, jr., '93.
R. E. Ozias, '92.

P.

J. W. Packard, '84.
*H. E. Packer, '70.
H. C. Paddock, '98.
*J. H. Paddock, '79.
P. M. Paine, '91.
*H. Palmer, '88.
H. L. Palmer, '96.
H. R. Palmer, '99.
M. P. Paret, '78.
C. J. Parker, '88.
C. W. Parkhurst, '93.
D. W. Patterson, '93.
G. S. Patterson, '83.
W. A. Payne, '94.
R. R. Peale, '83.
H. R. Peck, '97.
J. G. Peck, '93.
F. S. Pecke, '75.
J. H. Pennington, '97.
W. C. Perkins, '90.
F. A. Perley, '98.
R. S. Perry, '88.
*F. B. Petersen, '85.
J. G. Petrikin, '96.
G. F. Pettinos, '87.
J. R. Pettit, '99.

W. V. Pettit, '94.
J. H. Philips, '95.
A. E. Phillips, '90.
J. Phillips, jr., '95.
R. H. Phillips, '87.
F. W. B. Pile, '88.
C. Platt, '90.
J. S. Polhemus, '72.
R. K. Polk, '87.
C. P. Pollak, '87.
M. W. Pool, '96.
H. F. J. Porter, '78.
R. H. E. Porter, '89.
H. A. Porterfield, '83.
A. Potter, '90.
G. E. Potter, '80.
S. C. Potts, '94.
J. L. Poultney, '95.
E. W. Pratt, '90.
M. D. Pratt, '87.
H. R. Price, '70.
J. B. Price, '85.
E. J. Prindle, '90.
F. H. Burnell, '83.
M. H. Putnam, '97.

Q

C. W. Quarrier, '98.
E. A. Quier, '91.
H. C. Quigley, '95.

R

L. T. Rainey, '99.
F. DeW. Randolph, '92.
R. B. F. Randolph, '93.
W. K. Randolph, '78.
L. J. Rankin, '96.
R. S. Rathbun, '92.
A. G. Rau, '88.
C. R. Rauch, '77.
C. E. Raynor, '88.
R. H. Read, '78.
V. C. Records, '98.
H. B. Reed, '70.
H. P. Reed, '96.
Percy Lawrence Reed, '98.
Percy Lesley Reed, '99.
W. M. Rees, '74.
A. K. Reese, '89.
A. S. Reeves, '84.
H. A. Reid, '96.
J. G. Reid, '93.
V. H. Reid, '99.
W. Reinecke, jr., '95.
E. T. Reisler, '87.
H. G. Reist, '86.
W. F. Rench, '91.
J. W. Reno, '83.
E. C. Reynolds, '93.
J. P. Reynolds, jr., '97.
S. A. Rhodes, '92.
W. P. Rice, '76.
F. E. Richards, '93.
G. T. Richards, '87.
H. Richards, '76.
J. W. Richards, '86.
L. W. Richards, '76.
W. P. Richards, '88.
G. M. Richardson, '86.
O. Rickert, '88.
E. Ricksecker, '82.
W. C. Riddick, '90.
B. D. Riegel, '98.
J. I. Riegel, '92.
J. S. Riegel, '90.
S. S. Riegel, '97.
E. J. Rights, '95.
H. T. Rights, '95.

G. W. Ritchey, '93.
S. N. Riter, '95.
M. Rock, '69.
T. C. Roderick, '94.
A. L. Rogers, '89.
C. L. Rogers, '83.
F. W. Roller, '94.
C. E. Ronaldson, '69.
*W. D. Ronaldson, '70.
D'A. W. Roper, '98.
*A. S. Ross, '86.
E. P. Roundey, '97.
*G. Rovelo, '99.
H. W. Rowley, '85.
W. Royce, '97.
*G. A. Ruddle, '86.
J. Ruddle, '83.
J. D. Ruff, '82.
G. H. Ruggles, '96.
C. B. Rutter, '94.
C. C. Rutter, '96.

S

F. B. Sage, '93.
A. L. Saltzman, '97.
J. E. Sanborn, '90.
R. F. Sanchez, '98.
C. F. Sanders, '97.
F. W. Sargent, '79.
W. R. Sattler, '88.
*M. L. Saulsbury, '93.
W. H. Sayre, jr., '86.
J. A. Schloss, '93.
R. Schmitz, '91.
E. A. Schnabel, '91.
A. Schneider, '92.
H. Schneider, '94.
B. F. Schomberg, '94.
A. Schotte, '93.
C. W. Schwartz, jr., '89.
H. C. Schwecke, '98.
E. Schwinghammer, '95.
C. F. Scott, '97.
H. D. Scudder, '72.
W. McI. Scudder, '73.
*J. W. Scull, '87.
H. H. Seabrook, '97.
B. Searle, '84.
H. K. Seltzer, '95.
W. F. Semper, '93.
J. B. Semple, '92.
L. B. Semple, '84.
S. P. Senior, '97.
A. H. Serrell, '97.
J. C. Sesser, '96.
E. E. Seyfert, '94.
W. Shapleigh, '71.
A. B. Sharp, '93.
F. B. Sheaffer, '97.
C. K. Shelby, '92.
L. R. Shellenberger, '91.
*A. Y. Shepherd, '96.
G. E. Shepherd, '94.
D. F. B. Shepp, '98.
J. L. Sheppard, jr., '97.
H. J. Sherman, '90.
J. E. Shero, '95.
A. Shimer, '99.
I. A. Shimer, '91.
C. E. Shipley, '94.
E. H. Shipman, '88.
W. C. Shoemaker, '90.
L. D. Showalter, '96.
H. Shriver, jr., '96.
J. C. Shriver, '92.
E. P. Shuman, '97.
*S. B. Sickler, '82.
J. S. Siebert, '86.

R. S. Siegel, '95.
E. H. Sigison, '95.
J. B. Slack, '95.
J. E. Slade, '97.
A. P. Smith, '84.
*E. O. Smith, '85.
F. B. Smith, '97.
F. S. Smith, '87.
N. W. Smith, '93.
P. H. W. Smith, '92.
R. E. Smith, '94.
B. R. Smoot, '98.
A. M. Smyth, '89.
E. E. Snyder, '87.
M. D. Sohon, '90.
E. A. Soleliac, '93.
F. P. Spalding, '80.
J. H. Spengler, '86.
W. H. Speirs, '99.
H. W. Sprague, '97.
M. T. Stack, '97.
E. S. Stackhouse, '86.
L. C. Starkey, '98.
J. W. Stauffer, '98.
A. P. Steckel, '99.
E. G. Steinmetz, '95.
G. Stern, '93.
A. R. Sterner, '97.
T. Stevens, '86.
W. Alonzo Stevenson, '88.
W. Alston Stevenson, '90.
J. Stewart, jr., '97.
M. Stewart, '84.
H. T. Stilson, '91.
W. R. Stinemetz, '93.
C. H. Stinson, '83.
*R. Stinson, '83.
J. E. Stocker, '95.
A. W. Stockett, '89.
M. S. Stockett, '98.
L. Stockton, '81.
H. H. Stoek, '87.
W. H. Stokes, '88.
H. E. Stout, '86.
R. P. Stout, '91.
H. R. Stratford, '94.
P. B. Straub, '97.
R. M. Straub, '99.
T. A. Straub, '90.
*J. K. Surls, '86.
W. C. Swartz, '94.
F. G. Sykes, '94.
E. H. Symington, '98.
T. H. Symington, '93.

T

J. E. Talmage, '91.
R. M. Tarleton, '95.
C. L. Taylor, '76.
E. S. Taylor, '96.
J. Taylor, '93.
L. C. Taylor, '89.
R. S. Taylor, '95.
W. B. Taylor, '96.
W. P. Taylor, '86.
*O. O. Terrell, '87.
T. C. Thomas, '97.
J. M. Thome, '70.
C. H. Thompson, '94.
F. duP. Thomson, '90.
J. A. Thomson, '96.
A. T. Throop, '89.
N. Thurlow, '95.
E. C. Thurston, '96.
J. W. Thurston, '96.
C. M. Tolman, '85.
C. C. Tomkinson, '90.
W. S. Topping, '91.

H. Toulmin, '86.
P. Toulmin, '86.
C. F. Townsend, '95.
J. B. Townsend, '95.
C. E. Trafton, '96.
L. B. Treharne, '80.
W. Treichler, '97.
H. C. Tripp, '96.
P. H. Trout, '94.
L. E. Troutman, '93.
O. W. Trueworthy, '94.
R. H. Tucker, '79.
Charles P. Turner, '89.
Clarence P. Turner, '94.
Claude A. P. Turner, '90.

U

W. F. Ulrich, '99.
C. W. Underwood, '94.
W. E. Underwood, '97.
D. A. Usina, '91.
M. N. Usina, '92.

V

J. F. VanBenthem van den Bergh, '95.
A. H. VanCleve, '90.
E. Vander Horst, '89.
R. R. Van Duyne, '97.
B. R. Van Kirk, '80.
E. P. Van Kirk, '87.
W. R. Van Liew, '95.
C. H. Vansant, '95.
C. H. Veeder, '86.
J. S. Viehe '99.
J. R. Villalon y Sanchez, '90.
J. D. Von Maur, '94.

W

*J. R. Wagner, '85.
C. P. Wagoner, '97.
C. Walker, '89.
L. W. Walker, '92.
R. W. Walker, '84.
J. S. Wallace, '96.
U. G. S. Walters, '96.
E. H. Waring, '98.
F. C. Warman, '93.
E. O. Warner, '94.
W. Warr, '95.
C. B. Warren, '98.
R. C. Warriner, '94.
S. D. Warriner, '90.
J. A. Watson, '84.
L. Watts, jr., '98.
H. S. Webb, '98.
*C. G. Weaver, '71.
W. M. Webb, '88.
C. E. Webster, jr., '98.
H. D. Webster, '96.
J. E. Weideman, '97.
F. A. Weihe, '89.
F. T. Weiler, '96.
W. E. Weimer, '89.
J. H. Wells, '85.
G. E. Wendle, '91.
F. C. Wettlaufer, '99.
H. M. Wetzel, '88.
A. Weymouth, '94.
F. I. Wheeler, '95.
G. C. White, '97.
H. A. White, '95.
C. Whitehead, '85.
J. C. Whitmoyer, '95.
A. J. Wiechardt, '87.

E. N. Wigfall, '95.
H. A. Wilcox, '99.
H. A. J. Wilkens, '87.
D. S. Williams, '96.
D. T. Williams, '90.
E. H. Williams, jr., '75.
F. Williams, '87.
D. W. Wilson, jr., '96.
H. C. Wilson, '78.
J. R. Wilson, '96.
J. M. Wilson, '95.
T. W. Wilson, '94.
W. L. Wilson, '88.
P. B. Winfree, '91.
E. B. Wiseman, '88.
D. H. Witmer, '92.
N. J. Witmer, '87.
F. Wittman, '92.
M. Wittmer, '82.
L. T. Wolle, '77.
C. O. Wood, '92.
G. H. Wood, '99.
H. L. Wood, '95.
T. B. Wood, '98.
H. R. Woodall, '89.
B. E. Woodcock, '92.
L. Wooden, '98.
W. B. Wooden, '94.
*H. Woods, '87.
*F. C. Wooten, '80.
A. M. Worstall, '96.
W. Worthington, '98.
E. A. Wright, '89.
H. Wright, '90.
J. B. Wright, '89.

Y

S. Yamaguchi, '88.
G. L. Yates, '97.
*R. B. Yates, '70.
C. Yglesias, '95.
A. E. Yohn, '97.
S. A. Yorks, jr., '98.
G. F. Yost, '87.
F. S. Young, '97.

Z

C. F. Zimmele, '87.
H. B. Zimmele, '98.
H. S. Zimmerman, '98.
*C. F. Zogbaum, '75.
L. R. Zollinger, '88.

INDEX.